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TROPICAL DISEASES BULLETIN

Vol. 39.] 1942. [No. 7.

IMPERIAL MYCOLOGICAL INSTITUTE
4 AUG. 1942

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Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1.

Price 2/6 Net.] *Entered as Second Class Matter in the U.S.A. Post.* [Annual Subscription 21/-.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 39.] 1942. [No. 7.

SUMMARY OF RECENT ABSTRACTS.*

VI. PLAGUE.

Epidemiology.

Much of the literature on plague reviewed in 1941 comes from the countries of South America, where a large amount of work on human and rodent plague has been carried out. MOLL and O'LEARY (p. 321) give an account of the history of the disease in the various States showing that whereas in Colombia, the Guianas, Central America, the Dominican Republic, Haiti and certain smaller islands plague has not been reported, and whereas in Cuba, Mexico, Porto Rico, Panama and Uruguay it has proved easy to eradicate the disease, in other parts sylvatic plague has become established in the country districts, and presents a potentially grave danger. In Argentina this sylvatic plague is associated with the cuis (wild guineapigs), and after epizootics these animals have entirely disappeared from some areas, yet human infection is rare. In Bolivia man is believed to have played a principal part in transmission through the practice of holding wakes over the dead, with a final partition among the visitors of the blankets and clothing of the deceased.

The same authors (p. 625) state that in Chile plague has been restricted almost entirely to ports; the climate south of Valparaiso seems to be unfavourable to *Xenopsylla cheopis*, as does that of the desert areas surrounding the northern ports.

BARRETO (p. 322) refers to two foci in north-east Brazil. The first is almost entirely rural and the incidence increases in the harvest season; it is influenced by conditions of temperature and humidity, and is associated with a predominance of *Rattus rattus* in the rural areas. The second is in the city of São Paulo, where human cases occur every year. In north-east Brazil, MACCHIAVELLO (p. 624) failed to find evidence of plague in the wild rodents, and concludes that at present the disease is epizootic only in rats, especially *R. rattus*. Human plague occurs especially after the onset of the rainy season, because at that time of lower temperature the plague fleas, *X. cheopis*, are able to leave the shelter of the rat nests which they seek during the

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1941, Vol. 38. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

hot dry season. In São Paulo, JUNIOR (p. 323) reports that the various rat and flea indices were found to be most helpful; a 2 per cent. rat plague infection presaged a local human epidemic, a flea index of only 3 per rat is held to be scarcely compatible with the occurrence of human plague. [It will be remembered that a *cheopis* index of over 5 has been regarded as likely to produce an outbreak of bubonic plague, but JORGE (this *Bulletin*, 1929, Vol. 26, p. 97) has expressed doubts as to the value of this measurement.]

D'AMATO (p. 624) gives a list of recent outbreaks of plague in the Argentine. From investigations carried out in Mendoza, a province of the Argentine, DE LA BARRERA (p. 324) concludes that sylvatic rodents there have little contact with domestic rats, and that this accounts for the comparative absence of human plague in the presence of widespread epizootics. Under conditions of great increase of sylvatic fauna, as in an abnormally abundant harvest of maize, however, contact of domestic rats with field rodents is greatly facilitated, and the existence of sylvatic plague is therefore undoubtedly dangerous. PARDAL (p. 625) has found an infected cui in the Province of San Luis, in the Argentine. He notes that armadillos are not susceptible to plague.

In the United States, ESKEY and HAAS (p. 324) note that plague has not, apparently, spread eastwards beyond the Rocky Mountains, but that between the west coast and these mountains there is a vast area in which, though human infection is rare, the epizootic condition is widespread among ground squirrels, wood rats and prairie dogs.

BYINGTON (p. 326) shows how infection was found in 32 per cent. of pooled ectoparasites recovered from ground squirrels (Citellus) and wood-chucks (Marmota) in Wyoming, and reports that plague was the cause of an unusually heavy mortality in prairie dogs (Cynomys) in North Mexico, an area more than 150 miles from any other known plague infected region. Plague has been found in wild rodents and their fleas in Alberta, Canada, but GIBBONS and HUMPHREYS (p. 326) report that as yet no infection has been detected in British Columbia.

HARALSON (p. 626) refers to the centre of plague which still exists on the island of Hawaii, in which rodent and human infection occurs.

In the Annual Report of the Eastern Bureau of the Health Organisation of the League of Nations (p. 619) the view is put forward that, in tropical and sub-tropical countries, plague tends to die out in the lowlands and to spread inland, where it may become endemic in the cooler climate of mountain regions; countries in point are Java and Madagascar. It is pointed out that in the transmission of plague by fleas carried in ships during short voyages it is not the number or species of fleas which are of prime importance, but the number of infective fleas, and this depends perhaps entirely on climatic conditions. Plague seasons for different ports do not necessarily correspond.

In the Nilgiri hills, S. India, where plague has been endemic since 1903, GEORGE and TIMOTHY (p. 621) carried out a survey of field rodents, but failed to find evidence of sylvatic plague. The only infected rodents found were *R. rattus* from a definite plague area.

In S. Africa, DAVIS (p. 622) reports that plague is now enzootic in the rodent population over a large area, and human cases have occurred sporadically. Until recently the main source of infection for man was the multimammate mouse *Mastomys coucha* [which, it will be remembered, occupies abandoned nests of the gerbilles Taterona and Desmodillus, which are the main sylvatic reservoirs of the disease.

M. coucha also enters human dwellings and thus forms the link between the gerbilles and man]. Recently, however, *R. rattus* has been the source, particularly in the Orange Free State, and large numbers have died without traceable infection in the field rodents. It thus appears that *M. coucha* and *R. rattus* are forming reservoirs independent of gerbilles.

VAN HOOF (p. 623) writes of the two foci of sylvatic plague in the Belgian Congo; from the one near Lake Albert *R. rattus* is absent (a list of the rats and fleas concerned in the spread of the disease is given), but in the focus near Lake Edward *R. rattus* is found.

KAMAL (p. 626) notes that plague is endemic in Egypt, and is found in both towns and villages. KAMAL *et al.* (p. 626) point out that pigeon houses in Egypt, where these birds are kept for their excreta, which is used as manure, are badly infested with rats.

Aetiology and Transmission.

BHATNAGAR (p. 327) describes the envelope of the plague bacillus, which he distinguishes from a capsular structure such as is present in the pneumococcus. Strains of *P. pestis* may be virulent or avirulent, and the latter may be protective or non-protective for purposes of immunization. Virulent strains possess envelope substance in fairly large quantity, protective avirulent strains have less, and non-protective avirulent strains have no envelope substance but may acquire it if grown on horse serum agar. The largest amount of envelope substance is developed during growth at 37°C. He (p. 328) discusses the difficulty in distinguishing between *P. pestis* and *P. pseudotuberculosis rodentium*. He has found that certain strains of *P. pestis* possess envelope substance and that this interferes with the somatic type of agglutination. *P. pseudotuberculosis*, however, possesses no envelope substance but has a common somatic antigen with *P. pestis*. Suspensions made by mixing the two organisms were used for agglutination tests of envelope and somatic antigens and for immunization of animals. The author remarks that, to obtain reliable results in the serology of plague and of pseudotuberculosis, living organisms should be used, but if killed suspensions are preferred, plague bacilli killed by chemicals and pseudotuberculosis organisms killed by heat should be employed.

ESKEY and HAAS (p. 324) consider that it is a mistake to judge the degree of flea infestation of rats solely from the numbers collected from the bodies of captured animals, since this takes no account of those found in nests and runways. Nevertheless, infected fleas are not likely to survive long in abandoned nests. With regard to infection, they show that only 32 per cent. of exposed fleas were infected by the blood of guineapigs found to contain more than 10 bacilli to each microscopic field. Most infected fleas harbour the bacilli until they die, usually three days after the time when they are first able to transmit the disease, though there may be occasional survivals for as long as 11 days. Before transmission is possible after infection there is, in fleas, an extrinsic incubation period which may vary from 5 to 130 days. The life of the flea does not seem to be affected by plague infection until blockage occurs, when the flea dies of starvation. DAVIS (p. 622) also brings out the point that the numbers of fleas found on rats give no indication of the flea population of the habitat of the host. He describes the procedure for collecting fleas from rodent burrows,

and gives a list of fleas commonly caught in association with the rodents and rats of the northern part of the Orange Free State.

BARRETO (p. 322) shows that the most prevalent rat flea in Brazil is *X. cheopis*, both in rural areas and in ports, and that the next is *X. brasiliensis*. MOLL and O'LEARY (p. 321) note that *X. cheopis* is the dominant plague flea in the Argentine. ACKERT *et al.* (p. 623) give reasons for the opinion that *X. cheopis* is established in Kansas and point out that ground squirrels, mice and cottontail rabbits may harbour this flea, though the principal hosts are rats. The presence of this flea is an additional reason for precautions against rats, in view of the eastward spread of sylvatic plague.

Compared with Bombay, Calcutta has been relatively free from plague, yet RAO (p. 620) has shown that in all parts of the city *X. cheopis* is a common flea on the rats. The flea factor is quite favourable for the spread of plague in epidemic form provided that other epidemiological factors are also favourable.

Clinical findings.

In Brazil, MACCHIAVELLO (p. 624) refers to a disease known as cold bubo (*ingua de frío*) or stone fever, in which the bubo has a tendency "to become ligneous," or to be absorbed, or to recur. This condition has now been proved bacteriologically to be plague. A new plague syndrome is also described, in which there are multiglandular fever, localized suppuration, gastro-intestinal and urinary symptoms, septicaemic fever and wasting, but in which the case mortality is low. KAMAL (p. 626) states that in one epidemic in Egypt it was common to meet a large number of children with enlarged glands, sometimes tender, sometimes painless, but with no other symptoms. He regards these as cases of inapparent or ambulatory plague.

MURDOCK (p. 627) discusses pneumonic plague, outbreaks of which have occurred in Ecuador. He considers that such outbreaks almost invariably arise from cases of bubonic plague, in which secondary pneumonia has developed, and that the disease is then spread by inhalation to attendants or persons in close contact. The symptoms are described; in most cases the sputum is stringy, with pus and blood, and is usually found, on microscopic examination, to contain plague bacilli almost exclusively. Measures to control spread should be taken at once, and include rigid isolation of patients and contacts, protection of attendants by means of masks, gowns and rubber gloves, disinfection, house-to-house inspection of persons in infected sectors. In this inspection temperatures are taken twice daily, and isolation of all persons who show a rise in temperature, regardless of cause, is carried out.

JUNIOR and DE ALBUQUERQUE (p. 628) describe an allergic skin test, for which an emulsion of infected guineapig lymph gland was used, and which gave positive results in a few cases of plague. They consider that this test may also be useful retrospectively and thus be of epidemiological importance.

Treatment.

BONEBAKKER (p. 329) reports on the serum treatment of 111 cases of plague. While admitting that his investigations have not been carried out in such a manner as to make possible definite statistical

proof of the value of serum over bacteriophage or other methods, he has formed the impression that serum benefits the patients, and should not be withheld. It should be given early, daily, in fairly large doses until the temperature falls and the general condition improves. Details of dosage are given; the serum is injected intravenously, intramuscularly, and in and around the bubo. KAMAL (p. 626) in Egypt reports that with big doses of serum, pushed to 50–80 cc. each day, the results on the whole were gratifying, but KAMAL *et al.* (p. 626) state that combined treatment with serum and sulphapyridine appears to be the best.

WAGLE *et al.* (p. 628) have made a comparative study of the treatment of plague with serum, sulphapyridine, sulphathiazole and intravenous iodine. In all, 237 patients were treated and the results show a significant reduction in mortality in those treated with one of the first three substances over those treated with iodine, but there is no significant difference between the results obtained by serum, sulphapyridine or sulphathiazole. In cases of plague septicaemia, however, the two sulphonamides appeared to give considerably better results than serum. In a few pneumonic cases (all fatal) it was noticed that plague bacilli could not be found in the blood of those treated with sulphonamide, but were present in those treated with iodine. CHOPRA *et al.* (p. 629) report a case of plague in a child, successfully treated with sulphapyridine given both by mouth and, as the soluble sodium salt, intramuscularly. In the Belgian Congo VAN HOOF (p. 623) reports that of 12 patients treated with the sulphonamide preparation Astreptine, 10 died.

Control.

MOLL and O'LEARY (p. 321) refer to the importance of inoculation into animals of pooled fleas in the investigation of rodent plague. ESKEY and HAAS (p. 324) bring out the point that chloroform and ether, if used for collecting fleas from rodents, are apt to destroy *P. pestis*, and that it is better to use cyanide gas for this purpose. Fleas are transported in 2 per cent. salt solution, which inhibits the growth of putrefactive and other bacteria. The inoculation of fleas from wild rodents is a more reliable method of detecting plague than the examination or inoculation of rodent tissues. JUNIOR (p. 323) states that in the São Paulo area lymph glands of suspected rats from the interior are sent for examination in Broquet's solution :—neutral glycerine 20 ; calcium carbonate 2 ; distilled water 80. The glands should be removed as aseptically as possible and there should be no delay ; the material is used for the inoculation of guineapigs or rats.

This author (p. 323) reports on a focus of rat plague in São Paulo ; over 3,000 rats were killed, and plague was stamped out, but he remarks that after such a campaign it is necessary to be careful not to assume complete eradication of the disease, which may remain latent for a considerable time. A reduction of the usual proportion of four or five female rats to one male indicates that poison bait is effective, for it is the female rat which is specially active in search for food. He notes that special attention was paid to the cultural differences between the non-motile *P. pestis* and the motile *P. pseudotuberculosis rodentium* in the study of rat plague.

In the *Journal of the Egyptian Public Health Association* (p. 629) it is noted that if the general mortality in a village exceeds 3 per 1,000

per annum, or if more than one death occurs in the same family within six weeks, the bodies of those who die are kept for the M.O.H., who may permit burial. If, however, acute disease is suspected, punctures are made of the heart, liver and lungs, and the material obtained is sent to the district bacteriologist for examination. At the same time disinfection of the house and contacts is carried out, and contacts are examined ; if plague is found arrangements are made for removing patients to hospital and for isolation of contacts, especially in the case of pneumonic plague.

HOPKINS (p. 629) states that in Uganda the main control measures are those applied to rats and fleas. Rat proofing of stores is provided for by legislation, but is not fully carried out as yet ; fumigation of huts with Cyanogas is extensively carried out, but about one-quarter of the rat population survives the gassing. This is unsatisfactory, especially as fleas are killed less rapidly than rats. He makes certain recommendations concerning precautions which should be taken in gassing huts. In the Central Provinces of India, and Berar, where plague occurs both epidemically and sporadically, MAKAND (p. 621) states that Cyanogas A is used for rat destruction.

In Hawaii, HARALSON (p. 626) notes that the chief measure taken against plague is rat eradication by trapping or poisoning with banana-phosphorus bait.

In the Annual Report of the Eastern Bureau of the Health Organisation of the League of Nations (p. 619) the phenomenal decrease in deaths from plague in Java during the period 1934–1940 is referred to. Two entirely different methods of control are regarded as responsible for this :—the large-scale improvement of 1½ million houses between 1911 and 1938, and mass vaccination with Otten's living non-virulent vaccine since 1935.

Vaccination.

OTTEN (p. 330) gives an account of the investigations which led up to the employment of his live vaccine, prepared from the avirulent Tjiwidej strain of *P. pestis*, in Java. He shows that in a trial on a very large scale the mortality from plague fell, in those vaccinated, to about 20 per cent. of that experienced in the controls left unvaccinated. He discusses points important in the preparation of the vaccine, and gives reason for the opinion that a change in the strain towards increase of virulence is not probable.

VAN HOOF (p. 623) notes that in the Belgian Congo the use of the live vaccine with the E.V. strain of *P. pestis* [from Madagascar] is increasing, and that a large number of natives have now been vaccinated without accident.

MOLL and O'LEARY (p. 321) note that although vaccination [presumably with killed organisms] against plague in S. America is commonly used, especially in persons actively dealing with the disease, no very definite conclusions appear to have been drawn as to its efficacy. KAMAL *et al.* (p. 626) report that a very large number of persons in the epidemic areas of Egypt have been vaccinated [presumably with killed vaccine], but although the fatality from bubonic plague is decidedly lower in the vaccinated than in the non-vaccinated, the authors consider that vaccination *en masse* and during an epidemic neither reduces the chance of acquiring the disease nor stops the

epidemic. In Uganda, HOPKINS (p. 629) reports that vaccination is only performed in persons who have been specially exposed to the risk of infection. *Charles Wilcocks.*

MALARIA.

NOÉ (Juan) & NEGHME (Amador). Contribución al conocimiento de la epidemiologia malarica en la provincia de Tarapaca. III. Comunicación: Quebrada de Vitor (Codpa-Chaca). [**Epidemiology of Malaria in the Province of Tarapaca: Vitor Valley (Codpa-Chaca).**]—*Rev. Chilena de Hig. y Med. Preventiva.* 1940. Dec. Vol. 3. No. 3. pp. 199–230. With 2 folding maps & 13 plates.

Tarapaca is the northernmost province of Chile bordering Bolivia and Peru. The part surveyed consists chiefly of deep mountain gorges through which the River Codpa flows westward through arid pampas to the sea. Malaria is endemic along some 60 kilometres from Chitita, 2,200 metres above sea-level, down to Chacarilla, 300 metres high. Where the gorge widens sufficiently, fruit trees and vines are cultivated. The total population of this long area does not exceed 500. In a few of the highest settlements the houses are well constructed but lower down cane, grass and matting are the building materials most in evidence. The population are well fed but the miserable dwellings are often overcrowded. Needless to say this isolated community has no medical or sanitary service.

The authors spent a week in visiting practically all dwellings in this long narrow area, where communications are difficult. In all 319 persons were examined. Malaria was not uniformly distributed; communities at the two extremities of the valley were most severely infected. The spleen-rate, excluding 37 persons who had contracted malaria elsewhere, was 30·6 per cent.; the parasite rate was 20·7 per cent. There were 37 *P. falciparum* and 32 *P. vivax* infections. The only anopheline present was *A. pseudopunctipennis*. Of 697 dissected six harboured oöcysts.

Numerous photographs illustrate the type of country.

Norman White.

TORANZOS (Lazaro B.). Los cuatro primeros casos de paludismo en Mercedes (Prov. de Corrientes). Tres probables autóctonos. [**First Four Cases of Malaria in Mercedes, Province of Corrientes, Three of which Probably Indigenous.**]—*Semana Méd.* 1941. Aug. 14. Vol. 48. No. 33. pp. 406–408. With 4 figs.

The Province of Corrientes in the Argentine has hitherto been considered to be free from endemic malaria. Interest, therefore, attaches to the author's report of four cases of *P. vivax* malaria, in June 1940, in three of which infection was almost certainly acquired in the Mercedes Department of Corrientes. *Norman White.*

RUSSELL (Paul F.) & RAO (T. Ramachandra). **On Surface Tension of Water in Relation to Behavior of Anopheles Larvae.**—*Amer. Jl. Trop. Med.* 1941. Nov. Vol. 21. No. 6. pp. 767–777. With 1 chart. [13 refs.]

Anopheline larvae attach themselves to the surface film of water by the spiracular plate, the palmate hairs, the notched organs on the

thorax and the leaf-like appendages on the maxillary palps. When the surface tension of water is reduced from the normal of 70 dynes per cm. to a level varying with different individual larvae from 27–36 dynes, by the progressive addition of soap, the larvae are unable to hold to the surface and they sink and drown. No significant difference could be found between different species; nor was any correlation found between the surface tension of natural waters (no values below 65·5 dynes were recorded) and the presence or absence of larvae. [It would be interesting to know whether the authors have considered the possibility that it is not the surface tension itself but some other property of surfaces, such as the "angle of contact" between water and cuticle, which is the true factor concerned in this phenomenon.]

V. B. Wigglesworth.

WEYER (F.) & HUNDERTMARK (A.). Versuche ueber die Vorzugstemperatur einiger Anophelen bei der Eiablage. [**Preferred Temperature for Egg Laying by Some Anophelines.**]—*Riv. di Malariologia.* Sez. I. 1941. July–Aug. Vol. 20. No. 4. pp. 251–257.

The authors carried out experiments in the laboratory to discover the preferred temperature for oviposition by females of four varieties of *Anopheles maculipennis* (*typicus, messeae, atroparvus* and *labranchiae*) by offering them bowls of water at different temperatures. *A. superpictus* was also included. There was no significant difference between the temperatures chosen by the different varieties: *A. m. typicus* and *A. superpictus,* which normally breed in cooler water, showed no preference for this in the laboratory. The lowest temperature chosen was 15°C., the highest 36°C. The preferred range was 26°–30°C., most batches of eggs being in water at 30°C. Newly captured mosquitoes and those reared for many generations in the laboratory gave the same values. Thus the results provide no explanation for the geographical distribution of these forms, nor can temperature be the sole important factor in the choice of breeding places. *V. B. Wigglesworth.*

ASSAM MEDICAL RESEARCH SOCIETY, SHILLONG—1931–41 [VISWANATHAN (D. K.), Research Officer]. pp. 7–16.—**Malaria Carrying Anophelines in Assam.**

The species of Anopheles found in Assam are: *A. aconitus, A. annularis, A. barbirostris, A. culicifacies, A. hyrcanus, A. jeyporiensis, A. kochi, A. leucosphyrus, A. maculatus, A. maculatus* var. *willmori, A. minimus, A. pallidus, A. philippinensis, A. ramsayi, A. subpictus, A. tessellatus, A. umbrosus, A. vagus, A. varuna.*

During 10 years 70,049 mosquitoes were dissected. Infection was found in only six species, *A. aconitus, A. annularis, A. culicifacies, A maculatus* (and its variety *willmori*), *A. minimus,* and *A. philippinensis.*

Of 1,145 *A. aconitus* dissected only one was found infected, a gut infection: it is thus of no importance as a vector.

Nine infected *A. annularis* were found: 16,760 were dissected. The infected specimens were all from Lakhipur and Gauripur in the Goalpara District: *A. minimus* is very rare in this area, and *A. annularis* appears to be the only vector.

A. culicifacies is of very secondary importance as a vector: six infected specimens were found among 1,232 dissected, four in 1935 and two in 1939, all in Lumding.

A. maculatus has been found infected only in Shillong. In 1932, 1933 and 1934, when infected specimens were found, *A. minimus* was the chief vector ; in 1940, however, *A. maculatus* appeared to be the only vector but the degree of malaria prevalence was low. *A. maculatus* in Shillong is markedly zoophilic.

A. philippinensis was found infected on four occasions : 4,239 were dissected.

A. minimus showed an infection rate for the whole ten-year period of 5·16 per cent., 725 out of 14,092 dissected. The infectivity rate was 2·8 per cent. It was found infected in nearly all parts of Assam each year. From May to September the sporozoite rates are higher than the oöcyst rates. Sporozoites were found in every month except February. *Norman White.*

BOYD (Mark F.). **On the Varying Infectiousness of Different Patients Infected with Vivax Malaria.**—*Amer. Jl. Trop. Med.* 1942. Jan. Vol. 22. No. 1. pp. 73–81.

To assess the relative importance of factors which might account for the variability exhibited by patients suffering from *P. vivax* malaria in their ability to infect anophelines the author selected data from an extensive series of infection records. Data were selected concerning those patients who had served as mosquito infectors to whom at least three lots of *A. quadrimaculatus* had been consecutively applied, and in whom concurrent gametocyte densities had been determined. Data concerning lots of mosquitoes in which no infected specimens were discovered were rejected. Qualitative and quantitative infections are distinguished ; the former expresses the percentage of infected specimens encountered in a lot of mosquitoes, and quantitative infection expresses the frequency of cysts on the surface of infected stomachs. The author's summary of an interesting paper is as follows :—

" Patients infected with *Plasmodium vivax* exhibit a wide difference in their infectiousness for *Anopheles quadrimaculatus*.

" Based on the infection resulting in anophelines, patients have been distinguished as ' good ' and ' poor ' infectors. These have not in general differed markedly in gametocyte densities, except that on only a few occasions were the higher densities observed in the ' poor ' infectors.

" The qualitative and quantitative infection of the mosquitoes infected on patients of either category, varies directly with the gametocyte density, although at any given density the qualitative infection arising from a feed on a ' poor ' infector will more likely be lower than that resulting from an application to a ' good ' infector of comparable density.

" Although gametocyte densities in ' good ' infectors have tended to be slightly higher than in ' poor ' infectors, the most striking difference lies in the parity of the sexes in the ' good ' infectors, and deficiency of males in the ' poor ' infectors.

" Although the data submitted abundantly establish these relationships, gametocyte density is not a reliable guide to the probable resulting qualitative infection of mosquitoes.

" It is possible that varying proportions of susceptible and refractory mosquitoes in different lots affect the qualitative infection of any lot, particularly when the gametocyte density is low.

" These observations also suggest that the gametocytes of ' poor ' infectors are inferior, perhaps in vitality, to those produced in ' good ' infectors." *Norman White.*

BOYD (Mark F.). **The Comparative Susceptibility of Two Strains of** *Anopheles quadrimaculatus* **to Infection with Human Malaria Parasites.**—*Amer. Jl. Trop. Med.* 1941. Nov. Vol. 21. No. 6. pp. 751–753.

" Observations derived from mosquitoes collected in areas separated by about three hundred miles, indicate a very close parallelism in the susceptibility of two insectary strains of *Anopheles quadrimaculatus* to both *P. falciparum* and *P. vivax*."

COGGESHALL (L. T.). **Strains of** *Anopheles quadrimaculatus*. **Inheritance of Color Patterns in the Larvae of** *Anopheles quadrimaculatus*.—*Amer. Jl. Trop. Med.* 1941. Nov. Vol. 21. No. 6. pp. 755–765. With 3 charts & 2 figs.

VARGAS (Luis), CASIS (Guillermo) & EARLE (Walter C.). *Anopheles pseudopunctipennis*, **Theobald, a Vector of Malaria in Mexico.**—*Amer. Jl. Trop. Med.* 1941. Nov. Vol. 21. No. 6. pp. 779–788. With 1 chart. [21 refs.]

The importance of *Anopheles pseudopunctipennis* as a malaria carrier is rendered uncertain in many parts of the New World on account of the presence in the same localities of other recognized carriers such as *albimanus* and *tarsimaculatus*. In the region of Morelos around the village of Temixco in Mexico, a rice growing region at an altitude of 4,000 ft. with a high malaria incidence, it is shown that *A. pseudopunctipennis* is the only mosquito of importance. It is very plentiful, enters houses, prefers human blood, and was found infected in nature (0·3 per cent. of 1,246 mosquitoes with gland infections, 2·3 per cent. of 526 with oöcysts). Where this mosquito occurs at a lower density along with other species the authors consider that further study is required to establish its importance. *V. B. Wigglesworth.*

KOMP (W. H. W.). **The Occurrence of** *Anopheles darlingi* **Root in Central America.**—*Amer. Jl. Trop. Med.* 1941. Sept. Vol. 21. No. 5. pp. 659–670. With 4 figs. (1 map). [17 refs.]

" The dangerous vector of malaria, *Anopheles darlingi* Root, has been found in three places in Central America, in British Honduras, in Guatemala, and in Spanish Honduras. It has not hitherto been known north of Venezuela, in South America.

" Severe malaria is known to be present in British Honduras and in Guatemala, and this may be associated with the presence of *A. darlingi*.

" The species has probably been present for at least 15 years in Spanish Honduras.

" The present status of *A. darlingi* in Central America is discussed.

" Notes on the literature, showing the very high natural infection rates of this species in South America, are given.

" Suggestions as to future investigations are outlined."

ROZEBOOM (L. E.), FOX (L. A.) & LAIRD (R. L.). *Anopheles* (*Kerteszia*) *bellator* **D. & K., found Naturally Infected with Plasmodium.**—*Science.* 1941. Aug. 1. Vol. 94. No. 2431. p. 114.

A. bellator, though anthropophilic, does not remain in houses after it has fed, and is, therefore, hard to catch unless human bait is prepared.

The authors succeeded in capturing a considerable number, almost all of which appeared to be young females taking their first blood meals, but the 398th specimen dissected was found to have a single large oöcyst which was ruptured beneath the coverslip, with the release of large numbers of motile sporozoites. *C. W.*

ROZEBOOM (L. E.) & GABALDON (A.). **A Summary of the "Tarsimaculatus" Complex of** *Anopheles* **(Diptera: Culicidae).**—*Amer. Jl. Hyg.* 1941. May. Vol. 33. No. 3. Sect. C. pp. 88–100. With 4 plates. [21 refs.]

BOYD (Mark F.), KITCHEN (S. F.) & MATTHEWS (C. B.). **On the Natural Transmission of Infection from Patients Concurrently Infected with Two Strains of** *Plasmodium vivax.*—*Amer. Jl. Trop. Med.* 1941. Sept. Vol. 21. No. 5. pp. 645–652. With 2 figs.

In a previous paper the authors reported that the simultaneous presence of two strains of *P. vivax* appears to delay the development of an adequate homologous immunity to either strain [see this *Bulletin*, 1939, Vol. 36, p. 493]. This paper deals with the ability of anophelines to transmit either or both strains when infected from patients who had received simultaneous inoculation of trophozoites of two strains of *P. vivax*. The strains used were the McCoy and Cuban strains. Such mosquitoes were first used to infect susceptible patients. While the subsequent infection was clinically active the blood of the patient was subinoculated into convalescents from infections of the McCoy and Cuban strains respectively. The originally susceptible patients after their clinical recovery were reinoculated with the blood of patients showing clinically active infections with the McCoy and Cuban strains. Two such experiments were made; the results were not clear-cut. The Cuban strain was present in the test case in both experiments. In one experiment the McCoy strain was not demonstrated in the test case: in the second it seems to have been present in the test case before inoculation into convalescent patients.

"It would appear that anophelines infected on a person concurrently infected with two strains of a single species (*P. vivax*) may either: (*a*) become infected with but one of the strains, or (*b*) may possibly become infected with both of the strains and simultaneously propagate both. The experiments have not thrown any light on the possibility as to whether hybridization has or has not occurred under the second circumstance." *Norman White.*

SCHÜFFNER (W.). Zur Klinik der Malaria. [**Some Clinical Aspects of Malaria.**]—*Deut. Med. Woch.* 1941. Nov. 14. Vol. 67. No. 46. pp. 1251–1256. With 10 figs.

In a lecture at the Berlin Medical Association in July 1941, Schüffner dealt with a few of the clinical aspects of malaria on which research has thrown new light during the past 20 years. Some of the points specially stressed are as follows:—

A thorough examination of a thick drop preparation by a competent person always gives positive results, provided that the blood has been taken during a febrile paroxysm: a negative finding during fever-free intervals does not exclude malaria.

In benign tertian infections relapses occur in at least 50 per cent. of the cases irrespective of the kind or duration of the treatment. A

short course of treatment with quinine or atebrin, followed by the treatment of relapses as they occur saves the patient from the unpleasant effects of the drugs.

The frequent occurrence of a very prolonged incubation period in benign tertian infections is probably related to the existence of a cycle of development of the parasites in the reticulo-endothelial system. The "initial fever" of a continued or remittent type which occurs in benign tertian lasts from one to six days: it is caused by a toxin of a different kind from that which is responsible for the intermittent paroxysms which follow. It never occurs in relapses or in later attacks and is resistant to quinine: it gives rise to a firm and lasting immunity against the special toxin which is concerned in its production. Some workers go so far as to assert that when the initial fever does not occur the case must be one of relapse or of a later infection, never of a first attack.

Several other points are dealt with in the lecture but most of them are of minor practical interest. *John W. D. Megaw.*

WRIGHT (Frederick J.). **Cerebral Malaria.**—*East African Med. Jl.* 1941. Nov. Vol. 18. No. 8. pp. 226–235.

This paper gives clinical notes of 16 cases of cerebral malaria; they illustrate the very diverse symptoms which may occur, some of which may cause considerable diagnostic difficulty. When blocking of cerebral capillaries by developing forms of *P. falciparum* occurs there is generally a gradual onset of coma. Sudden onset is usually caused by an embolism of malaria parasites; in such cases few or no parasites may be found in the peripheral blood. Epileptiform attacks may occur, and these may indicate the focal nature of the cerebral infarction. Malaria is responsible for a number of admissions to mental hospitals; seven such cases are cited. Three presented a schizophrenic state in which malaria may have played a precipitating rôle: a confusional state was noted in three of these patients. The pathology of such cases is not fully known; other organic diseases are followed by similar psychoses.

Cases of cerebral malaria may simulate meningococcal or pneumococcal meningitis; lumbar puncture is necessary in all doubtful cases. Virulent pneumonia, septicaemic plague, typhoid fever, tuberculous meningitis, trypanosomiasis, head injury, and alcoholic excess may all produce symptoms similar to those sometimes seen in cerebral malaria. Irritative phenomena may suggest tetany; even tetanus may be closely simulated. Permanent paralysis may result from cerebral malaria.

In the treatment of these cases the author relies on the use of intramuscular and oral quinine; quinine given intravenously has in his hands given but indifferent results. Having regard to the depth of coma which may be produced the large number of cases that recover places cerebral malaria among the most favourable forms of coma to treat. *Norman White.*

MENDEZ (Mario) & HUAMAN (Noe). Sindrome cerebeloso de origen malarico. [**Cerebellar Syndrome of Malarial Origin.**]—*Rev. Neuro-Psiquiatria.* Lima. 1941. Vol. 4. No. 1. pp. 106–112.

The authors describe the case of a boy, 13 years of age, who, during the course of a *P. vivax* infection, developed symptoms of incoordination and dysequilibrium characteristic of a cerebellar lesion. The

functions of the cerebellum are discussed and reference is made to reported cases of cerebellar involvement during the course of, or as a sequel to, various infections, including malaria. The ways and means by which the central and peripheral nervous system may be attacked by the malaria parasite or its toxin come in for discussion. On all these topics reference is made to recent literature. *Norman White.*

WILE (Udo J.) & MUNDT (Leslie K.). **Avoidance of Fatal Complications in Therapeutic Malaria.**—*Arch. Dermat. & Syph.* 1941. Dec. Vol. 44. No. 6. pp. 1078–1081.

Of over 1,000 patients who have received therapeutic malaria in the University Hospital, Ann Arbor, Mich., 29 died as a result of this treatment. The immediate causes of death were peripheral circulatory collapse 12, pneumonia 5, hyperpyrexia 5, suicide 2, and erysipelas, cerebral thrombosis, bleeding duodenal ulcer, ruptured spleen, and respiratory failure, one each.

Caution is required in the selection of patients for this treatment. The authors prefer not to treat patients over 55 years of age. Contra-indications to treatment are severe cachexia, diabetes, nephritis with renal insufficiency, hepatitis with insufficiency, active pulmonary tuberculosis, severe anaemia, extreme old age, and obesity. Malaria therapy should only be given to patients whose hearts are well compensated. All necessary measures to improve the health of the patient should precede malaria therapy.

Symptoms arising during treatment, and which are danger signals, are listed ; they may necessitate the interruption of the treatment. A temporary remission secured by the administration of thio-bismol just before an expected chill may be very useful [see this *Bulletin*, 1941, Vol. 38, p. 178].

Blood transfusion is the most efficacious treatment for peripheral circulatory collapse ; severe anaemia, jaundice, and persistent hypotension that may arise during malaria therapy all respond well to blood transfusion. *Norman White.*

FIGUEROA (Isabel). Breve estudio sobre las quinas colombianas. [**The Colombian Cinchonas.**]—*Bol. d. Inst. Nac. de Hig. Samper Martinez.* Bogotá. 1942. Jan. 24. No. 5. pp. 9–19. With 7 figs.

The author has analysed two species of cinchona in the National Institute of Hygiene, *viz. C. lancifolia* and *C. cordifolia*. A totaquina prepared from the native plants gave the following average percentage composition : Quinine 45·55, cinchonidine 10·79, quinidine, 4·59, cinchonine 3·31, amorphous alkaloids 10·76, resin 5·12, inert excipient 8·00, moisture 11·88. In a table is given a list of 80 samples with the amount of total alkaloids and of quinine as sulphate in each.

H. H. S.

JACOVACCI (Roberto). Terapia della terzana benigna mediante gli acridinici. [**Treatment of Benign Tertian Malaria with Acridine Derivatives.**]—*Riv. di Malariologia.* Sez. I. 1941. July–Aug., Vol. 20. No. 4. pp. 294–300. French summary (4 lines).

The author reports on the treatment of 24 primary cases and 55 relapsing cases of *P. vivax* malaria with Italchina, an acridine derivative, in conditions which rendered the possibility of reinfection unlikely. The drug was given in a dose of 30 cgm. a day for 5 days. In no case were there any signs of intolerance nor was there any staining of the

skin. Fever was suppressed in the majority of cases on the third day. Of the 24 primary infections only one relapsed within the period of observation. Of the 55 patients suffering from relapses, 12 had a subsequent relapse, and one had two ; the general condition of these 55 patients was more debilitated than that of sufferers from primary attacks. The author considers Italchina to be without rival in the treatment of benign tertian malaria. [See also this *Bulletin*, 1941, Vol. 38, p. 34.] *Norman White.*

FISCHER (Otto) & STAUPENDAHL (Wilhelm). Zwei Fälle von gleichzeitiger Chinin- und Atebrinueberempfindlichkeit. [**Two Cases of Supersensitiveness to Both Quinine and Atebrin.**]—*Med. Klin.* 1941. Nov. 28. Vol. 37. No. 48. pp. 1201–1204. With 1 chart.

These two cases indicate that atebrin is not always so harmless as is generally believed in cases of intolerance to quinine. In each case a mild attack of urticarial dermatitis followed the administration of one or more prophylactic doses of quinine and when this drug was replaced by atebrin the result was a severe attack of dermatitis with pronounced constitutional disturbance.

The first patient, a medical man, took a single dose of 0·3 gramme quinine and had swelling of the dorsum of the penis with slight urticaria of the inner aspects of the thighs, lasting about one day. Three days later he took 0·2 gramme atebrin and repeated the dose on the following day. Two days after starting the course of atebrin he had a sharp attack of urticaria, affecting the thighs and one arm : this cleared up in two days. Another similar course of atebrin was given about a week after the first ; this was followed by a more severe and prolonged attack of urticaria. A week later a small dose of 0·05 gramme atebrin was given : within a few hours the urticaria recurred and was even more severe than before ; this time the patient felt seriously ill and there was a trace of albumen in the urine. After recovery from these attacks this patient was found to have become supersensitive to various articles of diet—fish, strawberries and spices—he was also intolerant of pyramidon and noctal. There was a history of general sensitiveness to sunlight, X-rays and radium ; an injection of anti-typhoid vaccine had caused a severe reaction.

The second patient gave no history of any kind of supersensitiveness. He had taken prophylactic quinine in doses of 0·3 gramme daily for three weeks without ill effect, then he had a blue-red swelling of both arms and legs ; quinine was continued for another week, in the course of which the swelling became somewhat less, but was still visible. Quinine was stopped and he was given about 0·16 gramme atebrin daily for two days ; the swelling increased and within two days he had high fever which was suspected to be malarial so he was given 0·3 gramme atebrin in divided doses. He became much worse ; the temperature continued high for seven days and then fell steadily to normal in the course of the next three days. On the seventh day of the fever the total leucocyte count was only 1,900, a week later it was 11,000. There was severe generalized dermatitis with yellow staining of the skin, the liver was enlarged, the urine was heavily bile stained and contained a few red blood corpuscles. The patient was seriously ill but made a fairly rapid recovery.

In most of the serious forms of intoxication previously reported as being due to atebrin the doses have been large ; these two cases are exceptional in following small doses. The confidence of the authors in

atebrin has not been shaken by the occurrence of these exceptional cases, but it is suggested that preliminary test doses of atebrin should be given to persons who are specially sensitive to quinine or other drugs and that those who are found to be supersensitive should not be allowed to go to malarious places. *John W. D. Megaw.*

RUSSELL (Paul F.). **A Classification of Measures of Malaria Prophylaxis and Mosquito Control.**—*Amer. Jl. Trop. Med.* 1941. Sept. Vol. 21. No. 5. pp. 681–687.

Some malariologists may doubt the utility of any attempt at rigid classification of measures of malaria prophylaxis and mosquito control. The author of this elaborate and complete classification realizes that many dividing lines are not clear-cut except by arbitrary rulings. For those who find such classifications useful this paper will be helpful.

The author's limitation of the application of the term *naturalistic* is commendable. He does not consider such measures as sluicing to be naturalistic. His definition reads: "A naturalistic measure of mosquito control is one that, without primary dependence on chemical or mechanical measures or water manipulation, deliberately extends or intensifies natural control." *Norman White.*

ASSAM MEDICAL RESEARCH SOCIETY, SHILLONG—1931–41 [VISWANATHAN (D. K.), Research Officer]. pp. 23–45. With 12 graphs.—**Notes on Centres where [Malaria] Control Measures are in Progress.**

The Assam Medical Research Society has during the past 10 years been actively engaged in malaria control in many parts of the Province, and in this part of its report a summarized account is given of the measures employed and of the results achieved. Anti-larval measures, oiling and Paris green, sluicing, and shading, and attack on the adult mosquito by spraying with Pyrocide 20, are prominent among the methods employed. Some noteworthy successes are reported. Some of the results achieved are given below in tabular form :—

	Population	Spleen rate	Parasite index	Spleen rate	Parasite index
Nowgong	10,413	50·8 (1935)	32·5	4·3 (1940)	2·0
Gauhati	21,797	21·6 (1934)	24·0	2·9 (1940)	1·2
Mangaldai	1,696	31·5 (1934)	25·7	3·8 (1940)	1·5
North Lakhimpur ...	2,120	31·6 (1934)	46·4	11·9 (1940)	5·9
Doom Dooma ...	1,900	56·5 (1932)	40·0	11·7 (1940)	9·2
Jagadishpur group of villages	2,000	48·0 (1935)	40·0	7·5 (1939)	4·2
Bokpara and Budla Beta Tea Estates	4,900	78·8 (1936)	66·0	43·4 (1940)	27·0
Poloi Tea Estate ...		67·2 (1936)	91·6	39·2 (1941)	60·4

In all these places, as nearly everywhere in Assam, *A. minimus* is the most important, if not the sole, vector. *Norman White.*

BROWN (Omar J.) & WARE (Robert L.). **Observations on Mosquito and Malaria Control in the Caribbean Area.**—*U.S. Nav. Med. Bull.* 1941. Oct. Vol. 39. No. 4. pp. 614–631. With 3 figs. (2 on 1 plate). [13 refs.]

Somewhere in the Caribbean area, in a locality undisclosed for military reasons, a naval station and a marine camp were constructed. Malaria is mildly endemic in the part of the island concerned ; epidemic malaria may occur when conditions are favourable. The station, however, is fairly well removed from neighbouring towns. The advent of some 3,000 native workmen, 2·5 per cent. of whom harboured malaria parasites, and rather extensive actual and potential breeding places for *A. albimanus*, the local vector, seem to have been the chief factors causing the outbreak of malaria that is described. Rainfall from October to March was much in excess of the normal. The subsoil is impervious.

The authors describe the measures taken to control the disease. There was nothing unusual about these measures unless it be the use of an animal-baited mosquito trap, which is described and illustrated. The paper is designed for the edification of medical officers with little or no practical experience of malaria control ; for them the paper should be of interest. *Norman White.*

WATSON (Robert Briggs) & RICE (Margaret E.). **Further Observations on Mosquito-Proofing for Malaria Control.**—*Amer. Jl. Hyg.* 1941. Nov. Vol. 34. No. 3. Sect. C. pp. 150–159. With 3 figs.

A previous publication reported the results in malaria prevention obtained in 1938 by mosquito-proofing 98 houses in the Harris Station Area near Lake Wheeler in the Tennessee Valley [see this *Bulletin*, 1942, Vol. 39, p. 261]. Forty-five unscreened households in the same area served as a control. That work has been considerably extended. Before June 1939 all houses in that area, 207 in all, had been mosquito-proofed. In another area on the shores of Lake Wheeler, Cotaco Creek, 131 houses have been similarly dealt with ; this work was begun in June but not completed till August 1st, well on in the transmission season. A third area, Buckeye Swamp, in which anophelism was comparable with that of the other two areas, was used as a control : here 173 families living in unscreened houses were kept under observation. In Harris the negro and white populations are almost equal. The population of Cotaco is predominantly white, that of Buckeye predominantly negro.

Each household in the three areas was visited at intervals of not more than 10 days, mostly once a week. A house-to-house malaria survey was made at the end of April, at the beginning of August, and early in October ; that is before, at the height of, and after the season of malaria transmission. In these surveys an attempt was made to obtain blood-films from all individuals. The statistical method employed in the quantative evaluation of the results was described in the previous paper.

It would seem that protection offered by mosquito-proofing becomes fully operative during the first season of malaria transmission in which it is employed, and that protection during a part only of the transmission season results in a marked reduction in the rate of transmission. The amount of protection afforded by mosquito-proofing is very considerable. The percentage positive blood films in the October survey

were Harris Station 2·38, Cotaco Creek 2·25, and Buckeye Swamp 17·95. These rates were standardized for race. *Norman White.*

ROY (D. N.) & ROY (P. C.). **Observations on the Relationship between Malaria and Pistia in Two Villages in Murshidabad District.**—*Indian Med. Gaz.* 1941. Sept. Vol. 76. No. 9. pp. 538–542. [10 refs.]

P. C. Roy, Health Officer of Murshidabad, had been impressed by the unvarying presence of *Pistia stratiotes* in tanks and other anopheline breeding places in those parts of his district in which malaria was most prevalent. Two villages a quarter of a mile apart were selected. In one village all Pistia was removed from the numerous tanks, other types of aquatic vegetation being left. In the second village Pistia alone was left, other aquatic vegetation being removed. Eighteen months later there had been a remarkable decrease in malaria incidence in the Pistia-freed village, and an equally remarkable increase of malaria in the other. Death-rates, infant mortality rates and even birth-rates were affected. Unfortunately it was not possible to identify the local vector. "A strong suspicion rests on *A. philippinensis* even though Sinha recorded only one adult and we found none."

Norman White.

MISRA (Ananga Kumar). **A Method of oiling Streams and Drains by an Automatic Drip System.**—*Indian Med. Gaz.* 1941. Dec. Vol. 76. No. 12. pp. 739–740. With 2 figs.

A bottle is filled with oil, and the cork inserted. Through the cork is passed glass tubing ¼ inch in diameter and 2 inches in length so that some of the tubing projects from each end of the cork. Through the tubing are placed 6–12 stems of dried thatch grass, protruding beyond each end of the tubing. The bottle is inverted over running water and the oil drips steadily ; one pint is enough for 4–6 hours and will efficiently oil a stream 2 feet wide and 600 yards long.

A second type is made with a wide mouth bottle, through the cork of which are placed two glass tubes ⅛ inch in diameter. The bottle, filled with oil, is placed in the stream with the mouth facing the flow and so that one glass tube is submerged. Water is forced into this by the flow, and an equivalent amount of oil is forced out of the other tube, on to the water surface.

Both these methods are said to be effective. *C. W.*

REKSODIWIRJO. Een paar eenvoudige automatische afwatering-skleppen. [**A Couple of Automatic Drainage Valves.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1941. Nov. 25. Vol. 81. No. 47. pp. 2531–2534. With 5 figs.

The Calco valve is used in the sanitation of malarial regions to shut automatically at flood tide and to open off surface drains with the ebb tide. Some water gets into the system before the tidal pressure is sufficient completely to close the valve. The sluices used by the people of Karimoen, a sub-district of the Netherlands East Indies, are on precisely the same principle and are intended to prevent sea or brackish water entering the superficial ground water drains of their gardens. In the use of these sluices to close the surface culverts as an

antimalarial measure, the surface drain has its outfall in the deep discharge drainage cutting and the door is of iron. The substitute for this is a wooden door of one inch thickness hanging on two vertical supports. Instead, however, of having the surface drain with the door at its end, opening into the deep channel, the author proposes to place the sluice arrangement a little way in from the actual final opening. He constructs a hollowed tree bole to operate on the superficial drain and to have the sluice door on its outer end. In this way a complete closure and opening is much more easily effected with the tidal ebb and flow. Two varieties of this sluice system are suggested and the plan of the whole is clearly given in a series of line drawings.

W. F. Harvey.

EJERCITO (Antonio). **Field Experiment on an Automatic Siphon Sluice in Malaria Control (Design III).**—*Acta Med. Philippina.* 1941. July–Sept. Vol. 3. No. 1. pp. 129–145. With 9 figs., 2 plans & 3 sketches.

PRAMPOLINI (Natale). La bonifiche dell'Albania. [**Bonification in Albania.**]—*Riv. di Malariologia.* Sez. I. 1941. July–Aug. Vol. 20. No. 4. pp. 258–270. With 10 figs. French summary (6 lines).

This is an illustrated description of the extensive malarious regions still to be found along the coast of Albania, which the Italian Government in collaboration with Albania intend to reclaim one day. It constitutes a grandiose programme. The technical hydraulic problems involved are discussed. A brief account is also given of the bonification work that has already been carried out in Albania, descriptions of which have already been published.

Norman White.

AFRICA (Candido M.) & DY (Francisco J.). **Some of the Outstanding Achievements in Malaria Research during the Last Twenty Years.**—*Jl. Philippine Med. Assoc.* 1941. Oct. Vol. 21. No. 10. pp. 481–486. [16 refs.]

DEVINE (J.) & FULTON (J. D.). **Observations on the Nature of the Malarial Pigment present in Infections of Monkeys** (*Macacus rhesus*) **with** *Plasmodium knowlesi.*—*Ann. Trop. Med. & Parasit.* 1941. Oct. 21. Vol. 35. No. 1. pp. 15–22. [12 refs.]

The authors discuss the more recent work on the nature of the pigment produced by *Plasmodium knowlesi* during its growth within red blood corpuscles. It is noted that though SINTON and GHOSH, 1934 [this *Bulletin*, 1935, Vol. 32, p. 127] came to the conclusion that the pigment is haematin they actually failed to differentiate it from haematin chloride (haemin) which resembles it spectroscopically. In the present paper the authors describe their chemical and spectroscopic observations which indicate quite clearly that the pigment is indistinguishable from haematin.

C. M. Wenyon.

FULTON (J. D.) & YORKE (Warrington). **Studies in Chemotherapy. XXIX.—The Development of Plasmoquine-Resistance in** *Plasmodium knowlesi.*—*Ann. Trop. Med. & Parasit.* 1941. Dec. 31. Vol. 35. No. 2. pp. 233–239.

It was shown that *Plasmodium knowlesi* infections in *Macacus rhesus*, invariably fatal if untreated, could be controlled by four daily

intramuscular injections of plasmoquine in doses of 3·3 mgm. per kilo. of body weight. After this treatment parasites were absent from the blood for two to six days. Relapse then occurred and if untreated proved fatal. By repeated treatment in the above doses death could be averted for some weeks, if not entirely. In one animal the first repeated treatment produced a negative phase but the second repeated treatment failed to do so. This strain inoculated to another monkey produced an infection which failed to disappear with a dose of 3·3 mgm. per kilo. of body weight. A four-day course with double this dose likewise failed. This course was followed by a two-day course of 13·2 mgm. per kilo. of body weight. Even this had no effect on the parasites, the animal dying of a heavy infection. The strain passed on to the next monkey was found to be uninfluenced by a four-day course of 13·2 mgm. per kilo. of body-weight, the maximum dose tolerated by the monkeys. It was evident that the strain of *P. knowlesi* originally controlled by a dose of 3·3 mgm. per kilo. of body weight, by repeated exposure to the drug, had become so resistant that it failed to be influenced by four times this dose. Scarcity of monkeys prevented the stability of the resistance being estimated by treatment after further passages. *C. M. Wenyon.*

BOYD (G. H.) & DUNN (M.). **The Method of Action of Atabrine upon the Avian Malaria Parasite,** *Plasmodium cathemerium.*—*Amer. Jl. Hyg.* 1941. Sept. Vol. 34. No. 2. Sect. C. pp. 129–131. With 1 fig.

In an earlier paper [this *Bulletin*, 1940, Vol. 37, p. 189] the authors described experiments designed to throw light on the mode of action of quinine and plasmoquine on *Plasmodium cathemerium* infections in canaries. It was there indicated that both these drugs inhibit the occurrence of reproduction and cause a reduction in size of the schizonts so that fewer merozoites are produced. The actual rate of destruction of parasites is not, however, increased. In fact the actual rate of disappearance of parasites from the peripheral blood is greater in untreated than in treated birds. The observations on atebrin which are the subject of the present paper show that this drug has effects similar to those of the two previously tested. In the doses actually used atebrin produced results more quickly than the others, but this may be due merely to the dosages employed. *C. M. Wenyon.*

BECKMAN (Harry). **Atabrine Retardation of Schizogony in** *Plasmodium cathemerium* **Infected Canaries.**—*Amer. Jl. Trop. Med.* 1941. Nov. Vol. 21. No. 6. pp. 795–801.

When atebrin is administered to a bird infected with *Plasmodium cathemerium* certain changes occur. These are diminution in pigment, accentuation of vacuolation, reduction in number of merozoites, retardation of growth and raggedness of outline. Of these, retardation of growth was selected as being the most promising criterion of the action of atebrin. Infections induced by the injection of sporozoites were allowed to develop for a few days and blood films were made at a certain time. These were examined and the proportion of large to small parasites noted. Twelve hours later 0·1 mgm. of atebrin was injected intramuscularly and 12 hours later blood films were again made. As the cycle of development of the parasite is 24 hours, if there had been

no retardation of growth the proportion of large to small parasites should have remained the same as in the films made 24 hours earlier. It was found, however, that the proportions had been reversed. Thus in one case in the first film 82 per cent. of the parasites were large and 12 per cent. small. After treatment 23·5 per cent. were large and 76·5 per cent. small. It is possible that this phenomenon may be utilized for the comparison of antimalarial agents, but before this can be asserted further and more extended observations will have to be made. *C. M. Wenyon.*

COULSTON (Frederick) & MANWELL (Reginald D.). **Single-Parasite Infections and Exoerythrocytic Schizogony in** *Plasmodium circumflexum.—Amer. Jl. Hyg.* 1941. Sept. Vol. 34. No. 2. Sect. C. pp. 119–125.

By the methods of micromanipulation and serial dilutions the authors have succeeded in producing infections in canaries by the inoculation of single parasites within a red corpuscle. The infections thus produced are exceedingly slight, considerable search being required in some cases to discover a single parasite. On sub-inoculation the infection is heavier, while subsequent passages result in intense and fatal infections. Exoerythrocytic schizonts were never found in the primary infections, nor in those of the first passages. They appeared regularly after a number of passages had been made when the infections were heavy. These experiments would seem to indicate without any doubt that exoerythrocytic schizonts may originate from the pigmented stages in the red blood corpuscles. Furthermore it would seem that they develop when the defence mechanism of the host is at some disadvantage and in this respect they may be regarded as abnormal forms. *C. M. Wenyon.*

VARGAS (Luis) & BELTRÁN (Enrique). *Culex quinquefasciatus,* **a New Vector of** *Plasmodium gallinaceum.—Science.* 1941. Oct. 24. Vol. 94. No. 2443. pp. 389–390.

TRAGER (William). **Studies on Conditions affecting the Survival in Vitro of a Malarial Parasite** (*Plasmodium lophurae*).—*Jl. Experim. Med.* 1941. Nov. 1. Vol. 74. No. 5. pp. 441–462. With 2 figs. on 1 plate. [33 refs.]

As the author points out, very little is known regarding the factors which influence the survival of malarial parasites when kept in various liquid media. To throw some light on the problem the investigations on *Plasmodium lophurae* from infected chickens described in this paper were carried out. Blood from infected chickens was drawn off into heparin sodium chloride solution. The mixture was centrifuged and the deposit of infected and uninfected red cells was re-suspended in small Erlenmeyer flasks in a balanced salt solution having a high potassium content. To this balanced solution other ingredients, the influence of which was to be tested, were added as required. The criteria of survival were the infectivity of the suspension, the morphology of the parasites, the number of parasites present and the exflagellation of the male gametocytes. The temperature of the experiments varied from 39·5°C. to 42°C. The results showed that survival was better in the balanced salt solution than in other similar mixtures.

Survival was still further favoured by aeration, by increasing the density of parasites up to an optimum, by frequent renewal of the suspending medium, by the addition of concentrated red cell extract, by an optimal concentration of plasma or serum, chick embryo extract, glucose or glycogen, glutathione and probably yeast or liver extract. In the best preparations, as judged by infectivity, more than 40 per cent. of the parasites were alive on the third day, more than 20 per cent. on the fourth day and perhaps one per cent. on the fifth day and about half this percentage on the sixth day. There was evidence that the parasites multiplied during the first day, while an increase in the number of flagellating cells was an indication that development of male gametocytes was taking place. It is pointed out that the capacity of the male gametocytes to exflagellate is as good a test of survival as the determination of infectivity and is much easier to carry out. *C. M. Wenyon.*

WALKER (H. A.) & VAN DYKE (H. B.). **Control of Malaria Infection (*P. lophurae*) in Ducks by Sulphonamides.**—*Proc. Soc. Experim. Biol. & Med.* 1941. Oct. Vol. 48. No. 1 pp. 368–372. [10 refs.]

The authors have tested the action of three sulphonamides (sulphanilamide, sulphathiazole, sulphadiazine) on *Plasmodium lophurae* infection in young ducks by incorporating the drugs in the food. The infection, which progresses steadily if untreated, results in death of the ducks in 5–16 days. Under the influence of the drugs the infection is checked after a few days, so that the ducks survive for several weeks with few parasites in the blood. Of the three drugs tested sulphanilamide was the least effective. *C. M. Wenyon.*

TRAGER (William). **The Effect of Intraperitoneal Injections of Carbon Ink on the Course of *Plasmodium lophurae* Infections in Chickens.**—*Amer. Jl. Hyg.* 1941. Nov. Vol. 34. No. 3. Sect. C. pp. 141–149. With 2 figs. [16 refs.]

If chicks two or three days old are inoculated intraperitoneally, intracardially or intracerebrally with large doses of *Plasmodium lophurae* they develop intense infections with a peak on the fifth to seventh day followed by a rapid reduction in the number of parasites. In chickens more than three weeks old the peak is reached on the third day or sooner. If with inoculation of parasites to the older chickens injections of carbon ink into the posterior peritoneal cavity are commenced, the chickens behave like the younger chicks, the peak of the infection being reached later. It seems clear that the older chickens are able to develop a resistance to the parasites more quickly than the younger chicks, but this development is interfered with by the ink injections, which bring about a blockage of the lymphoid-macrophage system. The interference was with acquired rather than natural immunity, for the rate of increase of the parasites during the first three days was the same in treated and untreated chickens. It is remarkable that when the ink was administered intracardially no interference was noted, though this method of administration produced a greater degree of blockage of the lymphoid-macrophage system.

C. M. Wenyon.

TRYPANOSOMIASIS.

NIGERIA : REPORT ON THE MEDICAL SERVICES FOR YEAR 1940 [BRIERCLIFFE (Rupert), Director]. Appendix B. pp. 15–16.—**Report of the Sleeping Sickness Service, 1940.**

In consequence of the war there was only one sleeping sickness team at work during 1940, in the Benue Province, but the great reduction in the infection rate in the Northern Provinces has made it possible to stop the surveys. During the year 19,596 new cases were found and about 33,000, new and old, were treated ; in the Benue Province the infection rate was 9·7 per cent. Areas previously treated now show an infection rate of 1·7 per cent. There is still a high incidence in labourers in the Kabba, Ilorin and Niger goldfields.

Resettlement in the Anchau corridor has progressed and much of it has been made fly free. In parts of the Katsina Emirates 233 miles of clearing near villages, watering places and fords have been completed and the bulk of 128,000 people there should now be safeguarded in their home areas. *C. W.*

GIBBINS (E. G.). **Studies on the Bionomics, Control and Natural Infectivity of the Riverine** *Glossina palpalis* **Subspecies** *fuscipes* **Newstead in the West Nile District of Uganda.**—*Ann. Trop. Med. & Parasit.* 1941. Dec. 31. Vol. 35. No. 2. pp. 195–220. With 5 graphs, 1 map, 2 figs. & 2 plates. [16 refs.]

Sleeping sickness is still endemic in the West Nile district of Uganda ; this paper describes the natural history of *Glossina palpalis* in the area and bases recommendations for control upon an experimental study of the factors influencing the prevalence of the fly. *G. palpalis* is confined to the immediate vicinity of rivers and streams along which it may range for miles, often flying over the open water. Its numbers can be reduced to a safe level of less than two flies per boy-hour by what the author calls "rod clearings." These extend only 10 yards in width on either side of the river. But to be effective they must be at least 800 yards in length with the road crossing, or village that it is desired to protect, in the middle. Rod clearings are effective only if the grass is kept short ; when tall grass is allowed to grow they may be more favoured by tsetse than the untouched forest. Tall trees can safely be left provided the branches are cut away up to 15 feet from the ground. Growth on the islands in the rivers must also be kept short.

The factors limiting the fly to the water courses are uncertain ; humidity has no influence ; perhaps the food supply in the form of lizards and monitors is important. The effectiveness of the narrow clearings seems to be due to their preventing the fly from lingering along that section of the stream and perhaps exposing it more to the attacks of the large numbers of predacious dragon flies. Among 2,945 flies examined no gland infections were found, but 10 per cent. of 246 flies showed flagellates in the gut. *V. B. Wigglesworth.*

JACK (R. W.). **Report of the Division of Entomology [Southern Rhodesia] for the Year ending 31st December, 1939.**—35 pp. typescript. 1940. Salisbury, S. Rhodesia. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Jan. Vol. 30. Pt. 1. p. 8.]

The major portion of the medical and veterinary section (pp. 12–26) of this report deals with work against *Glossina* spp. In the northern districts, the position with regard to *G. morsitans*, Westw., is very satisfactory. The formerly infested country that had been cleared of fly by the end of the year amounted to at least 6,000 sq. miles. The infested areas in these districts are now relatively remote from the European settlement, although settlement is being extended in two sections as a result of the retreat of the fly. In all the districts, native cattle have been returned to areas from which they had been driven by the encroachment of the fly, and many roads closed to ox transport have been reopened. While the reduction in game that is involved is regretted, the result could not have been achieved within economic limits by any other measure.

In the Chipinga subdistrict (Melsetter Border), trypanosomiasis caused serious loss of cattle during the year. The border clearing has been crossed, apparently freely, by tsetse flies during the past two years, in spite of annual widening at suspected weak places. The deterioration in the position may be due to an increase in the density of the fly on the Portuguese side of the clearing. *G. brevipalpis*, Newst., apparently crossed the clearing more freely than *G. pallidipes*, Aust. This might be due to a possible greater density of the former species on the edge of the clearing or to its crepuscular and nocturnal habits. Its predominance considerably affects the usefulness of traps as it is not readily taken in them. The advance of *G. morsitans* in Portuguese territory towards the border at the southern end of the Melsetter district has apparently continued. The operations against *Glossina* spp. in individual districts are surveyed in detail by J. K. Chorley.

Chrysomyia bezziana, Villen., continues to be a serious pest of cattle in many localities. Several cases of infestation of man by *Cordylobia anthropophaga*, Grünb., were reported at Salisbury as well as two cases of intestinal myiasis due to unidentified species of *Sarcophaga* and a case of the infestation of the urinary tract of a European child by a Coleopterous larva. *Anopheles funestus*, Giles, was unusually common in the neighbourhood of Salisbury from March to July, and *A. gambiae*, Giles, was very abundant during April at a camp in the Hartley district and was observed to bite man during the daytime. *Culicoides inornatipennis*, C., I. & M., caused much annoyance at various localities in the Wankie district during the months of May and December.

JACK (Rupert W.). **Further Studies in the Physiology and Behaviour of** *Glossina morsitans*, **Westw.**—*Southern Rhodesia. Memoirs of the Dept. of Agric. No. III.* pp. 1–54. With 6 charts. 1941. Salisbury: Govt. Stationery Office.

In a previous paper [see this *Bulletin*, 1940, Vol. 37, p. 400] the author presented a large amount of data on the water content, fat content, temperature relations, etc., of *Glossina morsitans* reared in the laboratory. In the present paper he utilizes a long series of observations made by Mr. W. L. Williams in order to ascertain how

far these laboratory results are applicable to field conditions. Records of temperature and humidity were made throughout the year in the various localities occupied by *G. morsitans* in the evergreen river forest, in the savannah forest, and in the open at different altitudes. The figures obtained indicate the range of conditions in which this fly can flourish. In the Zambezi Valley where the shade temperature in October frequently exceeds 108·5°F. the fly must be driven to seek specially cool refuges and may be expected to suffer a serious setback. The many facts about the composition of wild flies (fat and water content, etc.) do not lend themselves to summarizing. But it is established that under dry conditions wild flies lose water in excess of replacement and in this desiccated state they are very reluctant to leave the shade.

V. B. Wigglesworth.

FRIEDHEIM (Ernst A. H.). Contribution à la chimiothérapie par les arsénicaux organiques. L'azo-arséno-benzol dans le traitement de la syphilis et de la maladie du sommeil africaine. [**Contribution to the Chemotherapy of the Organic Arsenicals.**]—*Schweiz. Med. Woch.* 1941. Nov. 29. Vol. 71. No. 48. pp. 1502–1504. With 4 figs.

The action of the arsenobenzols is limited owing to the colloidal character of their solutions which prevents them from traversing the haemato-encephalic and haemato-ocular barriers ; and consequently their value in the treatment of the nervous stage of sleeping sickness or syphilis is nil. The haemato-encephalic barrier shows a tendency to be permeable by organic anions, and Friedheim has prepared a series of arsenobenzols containing strongly acid groups, and in particular has condensed salvarsan with sulphonic acid compounds. Continuing his researches, Friedheim has discovered a compound designated azo-arseno-benzol 4197, which gave results in therapeutic experiments in laboratory animals sufficiently hopeful to justify clinical trial in sleeping sickness and syphilis.

The substance designated 4197 is the sodium salt of 4 : 4′-dihydroxy-arsenobenzol-3 : 3′-bis [(azo-2) naphthol-(1)-disulphonic acid-4,8]. It contains 13·8 per cent. of arsenic, is very soluble in water and insoluble in lipoids. It can be prepared in a crystalline state ; it does not contain the ortho-amino-oxy and the amino-methylene-sulphoxylate groups which are in large measure responsible for the instability of neosalvarsan. It is stable indefinitely in the air at 18° to 20°C. ; and solutions are also perfectly stable under similar conditions for at least 6 months, but at 37°C. solutions undergo changes and the toxicity increases.

This substance differs from the usual organic arsenicals in that it can traverse animal membranes ; half an hour after the intravenous injection of 0·1 gm. per kilo. into a rabbit it can be found in the aqueous humour, and six hours later in the cerebrospinal fluid. It is eliminated by the kidneys and colours the urine reddish violet. The mouse tolerates a maximum intraperitoneal dose of 0·16 to 0·20 gm. per kilo. and mice infected with *T. equiperdum* or *Sp. recurrentis* are cured by doses of 0·008 to 0·012 gm. per kilo. In the rabbit the maximum tolerated dose intravenously is 0·125 gm. per kilo. ; rabbits infected with *T. equiperdum* are cured by a single dose of 0·02 gm. per kilo. and with experimental syphilis (testicular chancre caused by

Sp. truffi) by a similar single dose or by 5 injections of 0·01 gm. per kilo. given over 10 days. Dogs tolerate an intravenous dose of 2·0 gm. per 25 kilos.

In 1939, Friedheim visited French West Africa in order to test compound 4197 on cases of sleeping sickness and syphilis. The preparation used was a 5 per cent. watery solution put up under sterile conditions in ampoules in the presence of air. The standard dose was 0·5 gm. and this was perfectly tolerated by the great majority of adult patients, and even by children of 20 to 25 kilos. The dose was repeated 8 to 12 times at intervals varying from 2 to 4 days. Doses of 0·75 gm. were tolerated by adults in good general condition when given 5 times at intervals of 2 or 3 days. The largest dose given and tolerated without ill results was 0·9 gm. in a man of 68 kilos., *i.e.* 0·013 gm. per kilo. In patients in poor general condition and in those with encephalitic lesions, the initial dose should be small (0·1 gm.) as otherwise there may be violent reactions of the Herxheimer type.

Therapeutic effects.—In 38 of 41 sleeping sickness cases, the trypanosomes disappeared from the blood and from the glands after the first injection, and in the other 3 cases after the second injection. The effect on the cerebrospinal fluid is summarized in a table. The author states that headache generally disappeared after the 1st or 2nd injection, and somnolence after the 3rd or 5th injection. The table gives some details of 7 patients with changed spinal fluid who had not previously been treated and of 4 who had proved refractory to previous treatment. Only the immediate results are given. The duration of treatment was usually 14 to 17 days, but in two cases it was 5 and 7 weeks, respectively. In all cases there was a considerable fall in the cell count at the end of treatment, but in only one case was the cell count approximately normal and in this case it was only 36 before treatment began. The ill effects resulting from treatment were negligible. Neither renal nor ocular lesions were noted.

The last part of the paper deals with the results obtained in syphilis. In all, 40 cases of primary and secondary syphilis were treated. The immediate results, which are described in some detail, appear to be very favourable.

The author reaches the general conclusion that the substance in question has shown an energetic trypanocidal and spirochaetal action, in 41 cases of sleeping sickness including 4 arsenic-resistant cases, and in 40 cases of primary and secondary syphilis, including 2 arsenic-resistant cases. [For this author's work on triazine arsinic acid in sleeping sickness see this *Bulletin*, 1941, Vol. 38, p. 634.]

W. Yorke.

Wood (S. F.). **Notes on the Distribution and Habits of Reduviid Vectors of Chagas' Disease in the Southwestern United States (Hemiptera, Reduviidae).**—*Pan-Pacif. Ent.* San Francisco. 1941. Vol. 17. Nos. 2–3. pp. 85–94 ; 115–118. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Mar. Vol. 30. Pt. 3. pp. 46–47.]

A list is given of the Triatomids collected during field work on the distribution of the vectors of *Trypanosoma cruzi* in the south-western United States. They comprise eight species taken from the nests of wood-rats (*Neotoma* spp.) and also *Triatoma longipes*, Barber. The principal food used for the bugs in the laboratory was the blood of white

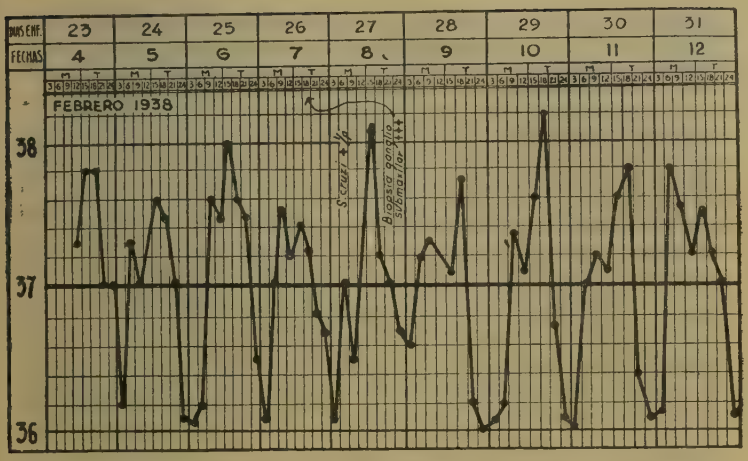
rats. The method of exposing the rats to the bugs and of storing the bugs between feeds is described. Each of the nine species is then considered in detail. Lists are given of the localities in which uninfected individuals and infected ones, if any, were found. The species found naturally infected with *Trypanosoma cruzi* were *Triatoma protracta*, Uhl., *T. protracta woodi*, Usinger, *T. rubida*, Uhl., *T. longipes*, and *T. gerstaeckeri*, Stål. The numbers of these species taken were 1,211, 489, 771, 152 and 55, respectively, the numbers examined were 957, 415, 230, 62 and 54 and the numbers infected 196, 20, 3, 10 and 3. *T. rubida* was referred to in a previous paper as *Eutriatoma uhleri*, Neiva [which Usinger considers a subspecies of it]. The numbers of the other four species found and usually the number examined are given, and also the numbers of each species found in wood-rat nests, houses, tents, etc., and the numbers of adults and small, medium-sized and large nymphs. Notes are included on the bionomics of the bugs. Three females of *Paratriatoma hirsuta*, Barber, were found infected 10 days after feeding on a *Peromyscus* that had been infected by inoculation. There were numerous crithidia in their faecal deposits, and 21 days after feeding, numerous trypanoform and crithidial stages were demonstrable. A white mouse inoculated with their faeces showed typical *Trypanosoma cruzi* in its blood 14 days later.

MAZZA (Salvador), BASSO (Germinal) & BASSO (Redento). Investigaciones sobre enfermedad de Chagas. Caracteres de la curva térmica en primer período de la enfermedad de Chagas. [**Characteristics of the Temperature in the Early Stages of Chagas's Disease.**]—*Universidad Buenos Aires: Misión de Estudios de Patología Regional Argentina Jujuy. Publicación No. 58.* 1941. 72 pp. With 63 figs. [10 refs.]

Fever of an intermittent character persists as long as the trypanosome is present in the blood in Chagas's disease, but little attention has hitherto been paid to this feature of the disease. Charts are reproduced in this article showing in most a daily rise to 38°C. or thereabouts—occasionally a point or two higher, more commonly two or three points lower—and a fall to 36·2°–36·4°. Some, however, show a double peak, even three in 24 hours are reported, but in the intervals between these the drop is only 0·2°–0·4°, the larger fall to below normal occurring between the evening rise of one day and the morning rise of the next. (See part of chart reproduced.)

This intermittent quotidian type of fever with a double peak is strong presumptive evidence of Chagas's disease in countries where this disease is known to occur and brings the condition more into line with visceral leishmaniasis (kala azar), for in Chagas's disease this type of temperature is found to coexist with leishmanial forms invading the tissues.

This article contains more than the title indicates. In addition to several temperature charts it contains photographs of patients showing the characteristic Romaña's sign, many photomicrographs of the histological changes, and teleradiographs with cardiometric measurements. All of these are excellently reproduced. [Without wishing to detract from the value of the excellent article, perhaps it would be wise to sound a note of warning. Kala azar exists in the Argentine, the senior author of the present paper has himself noted the fact (see this



Part of temperature chart of a patient harbouring *T. cruzi* in the blood.

[Reproduced from *Universidad Buenos Aires: Misión de Estudios de Patología Regional Argentina Jujuy. Publicación No. 58.*]

Bulletin, 1941, Vol. 38, p. 251), and as Chagas's disease was for a long time believed to be the cause of goitre in certain districts where the latter existed, and was later shown to be merely co-existent without aetiological connexion, so *possibly* these cases of Chagas's disease with double peaked temperature chart, leishmanial forms in glands, etc., may be examples of co-existent Chagas's disease and kala azar. The author may have taken measures to eliminate the latter; if not, further investigations with that end in view will doubtless be undertaken.]

H. H. S.

LEISHMANIASIS.

SMITH (R. O. A.), HALDER (K. C.) & AHMED (I.). **Further Investigations on the Transmission of Kala-Azar. Part IV. The Duration of Life and Other Observations on "Blocked" Flies.**—*Indian Jl. Med. Res.* 1941. Oct. Vol. 29. No. 4. pp. 783–787. With 2 figs.

In previous communications [this *Bulletin*, 1941, Vol. 38, p. 256] the authors have described the phenomenon of blockage of the oesophagus of sandflies infected with leishmania. This blockage is of such a nature that the ingestion of blood is impossible, though the flies may make repeated attempts to feed. It seems possible that though blood will not pass the block, fluid from raisins may do so, for certain blocked flies have survived longer than would be the case if no fluid had been imbibed.

The experiments reported in this paper were commenced in May 1940 and blocked flies were obtained during the succeeding six months. The flies were fed on a patient with kala azar and then kept in an

unregulated incubator with a wet-bulb thermometer registering from 79°F. to 87°F. They were supplied with raisins on which to feed for 10 days, when they were offered a second feed of blood on an experimental animal. It was at this feed that the blockage was detected, for the flies made repeated attempts to obtain a blood meal. These attempts were repeated each day, and usually if a fly did not attempt to feed it was found dead the next day. After having been given a chance of feeding on an animal the flies were tubed with raisins. A comparative experiment was made by giving a batch of flies a feed on a patient with kala azar and then keeping half on a raisins diet and the other half on repeated blood meals. Blocked flies were detected only amongst those fed on raisins after the infective feed.

As regards the survival of blocked flies, of 73 observed, 39 died within 24 hours, 13 within 48 hours, 13 within 72 hours, 6 within 96 hours, and 1 each on the next two days. It is noteworthy that amongst flies that have been found naturally infected few had heavy infections. This may be due to the fact that blocked flies show no sign of having had a blood meal, while it has been the practice when capturing flies for dissection to disregard those which have shown no evidence of a blood feed. [See also Part VI of this series below.]

C. M. Wenyon.

SMITH (R. O. A.) & AHMED (I.). **Further Investigations on the Transmission of Kala-Azar. Part V. An Inquiry into the Relation between Malaria and Kala-Azar in a Rural Area.**—*Indian Jl. Med. Res.* 1941. Oct. Vol. 29. No. 4. pp. 789–797. With 1 graph.

NAPIER and KRISHNAN [this *Bulletin*, 1932, Vol. 29, p. 495] have suggested that kala azar may be the result of dissemination of leishmania from a quiescent focus in the skin as a result of typhoid in urban districts or malaria in rural districts, both of which produce reactions in the reticulo-endothelial system with the mobilization of large mononuclears in the blood. It is also stated that malarial parasites are rarely seen in the blood of kala azar patients because of the marked histiocyte proliferation which is a feature of this disease.

As in various parts of Bihar localized epidemics of malaria have been followed by a considerable increase in the incidence of kala azar, an opportunity presented itself for studying the connexion between the two diseases. An area was chosen in which an epidemic of malaria commenced in August 1938, and in March 1940 at a treatment centre a record was kept of the cases with malaria and kala azar. A total of 900 patients were examined and of these 234 were diagnosed as kala azar and 257 malaria. Of the 234 cases of kala azar an association with malaria was detected in only 15. In 195 cases kala azar was found already established at the first visit of the patient to the centre. A careful examination of the figures relating to the age incidence, size of spleen and probable duration of the kala azar did not support the view expressed above—though it seems probable that the sudden increase in cases of kala azar was the result of a lowered resistance brought about by malaria. From a practical point of view it is noted that, in rural areas where both diseases are prevalent, measures directed against the adult forms of the vectors of malaria and kala azar, all of which take shelter in houses, are more likely to produce good results than attempts to attack the larval stages, which are found in totally different environments and are spread over wide areas. *C. M. Wenyon.*

SMITH (R. O. A.), HALDER (K. C.) & AHMED (I.). **Further Investigations on the Transmission of Kala-Azar. Part VI. A Second Series of Transmissions of *L. donovani* by *P. argentipes*.**—*Indian Jl. Med. Res.* 1941. Oct. Vol. 29. No. 4. pp. 799–802.

In a previous paper [this *Bulletin*, 1941, Vol. 38, p. 256] the authors described experiments with sandflies, in which a new method of feeding led to blockage of the oesophagus by developing flagellates and the successful transmission of infection by such blocked sandflies. The new method of feeding was the maintenance of the sandflies on a raisin diet after the infective feed on a kala azar patient, instead of the repeated blood feeds employed in earlier investigations. As it seemed that the successful results reported in the previous paper may have been due to a peculiar virulence of the strain of leishmania used, rather than to the intensive development resulting from the new method of feeding, it was decided to test the powers of transmission of sandflies maintained by both methods. Accordingly a batch of sandflies, after feeding on a patient with kala azar, were divided into two lots, one of which was given repeated blood meals and the other the opportunity of feeding on raisins. Ten hamsters were used for the experiment and each was given approximately 10 infective feeds. Five were fed upon by sandflies which had had the raisin diet and all were infected. Of five fed upon by sandflies which had had repeated blood meals four failed to become infected, while the fate of one which escaped became unknown. In addition to the experiments with hamsters, 16 mice were given a varying number of infective feeds. Of 12 which it was possible to examine later for evidence of infection four were proved to have been infected, but whether by raisin-fed flies or not is not stated.

It would seem from these experiments that it was the new method of feeding rather than the virulence of the parasite that was responsible for the successful transmission. *C. M. Wenyon.*

YAO (Y. T.) & WU (C. C.). **The Finding of *Phlebotomus chinensis* Newstead from Yunnan and its Bearing on the Transmission of Kala-Azar in South China, with Remarks on the Success in infecting Chinese Hamsters with Flagellates from Naturally Infected *P. chinensis* found in Tsingkiangpu.**—*Chinese Med. Jl.* 1941. Sept. Vol. 60. No. 3. pp. 232–240. [24 refs.]

In this article the authors discuss the relationship of kala azar in China to *Phlebotomus chinensis*, which is shown to be the chief, if not the only, vector. The sandfly has been recorded chiefly from districts north of the Yangtse river and in these kala azar has been shown to be endemic. South of the river, however, the close association of this sandfly with kala azar has yet to be demonstrated. The sandfly has been collected in the Province of Yunnan and on the island of Hainan, where kala azar has not yet been found, while cases of the disease have been identified in Chekiang, Kiangsu, Kiangsi, Kwangsi, and Kwangtung where *P. chinensis* has not yet been seen. So close, however, is the relationship of this sandfly to kala azar in N. China that it can be confidently expected that where the sandfly occurs in S. China there kala azar will ultimately be found to occur and that where kala azar has been recognized the sandfly will sooner or later be discovered.

It is noted that in a batch of *P. chinensis* collected in a village in Tsingkiangpu, an endemic centre of kala azar north of the Yangtse,

10 were found to be infected with leptomonads. The flagellates from six of these were injected intraperitoneally to 11 Chinese hamsters, four of which acquired a visceral leishmania infection.

C. M. Wenyon.

KIKUTH (Walter) & SCHMIDT (Hans). Chemotherapeutische Untersuchungen mit Neostibosan und Solustibosan bei mit Leishmanien infizierten Hamstern. [**Neostibosan and Solustibosan in Leishmania-infected Hamsters.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1941. Aug. 12. Vol. 100. No. 3. pp. 157–178.

In an earlier publication [this *Bulletin*, 1938, Vol. 35, p. 870] the authors gave an account of experiments with neostibosan and solustibosan in the treatment of European hamsters experimentally infected with *Leishmania donovani*. They showed that bi-weekly doses of neostibosan for five weeks (10 doses in all) had a greater curative effect than the solustibosan administered in the same way and in doses giving an equal quantity of antimony. When the course was shortened and 12 doses given in two weeks, solustibosan gave better results than neostibosan. With a still shorter course, of eight doses in eight days, it appeared that a smaller quantity of antimony in the form of solustibosan gave the same result as larger quantities in the form of neostibosan.

These results were not confirmed by WANG [this *Bulletin*, 1939, Vol. 36, p. 452] who carried out experiments with infected Chinese hamsters. He found that in daily doses neostibosan gave better results than solustibosan, and that more antimony in the form of solustibosan was required to bring about cure.

With a view to throwing light on the question the authors carried out a further series of experiments which are described in the present paper. In the first place 15 infected hamsters were treated with 10 daily doses of neostibosan (500 mgm. per kilogram of body-weight) and a like series with 10 daily doses of solustibosan in the same amount. The animals were killed and examined for infection at intervals up to six months after treatment. Two of the solustibosan-treated animals were found infected when killed but none of those treated with neostibosan, though one of them was shown to be still infected at an earlier date when liver puncture was performed. It is pointed out that in the neostibosan series each animal received 2,100 mgm. of antimony, whereas in the solustibosan series each animal received only 1,350 mgm. of antimony. This experiment indicated that in the doses employed a 10-day course of either drug was almost sure to eradicate an infection. In another experiment some animals were treated with the same daily doses of the two drugs for 10 days, and others with bi-weekly doses during five weeks. All the solustibosan-treated animals were cured, as also were those treated with bi-weekly doses of neostibosan. Of six which received 10 daily doses of neostibosan three were found infected when examined, a result which at first sight does not appear to agree with those of the first experiment. When the experiments were carried out with doses of 300 mgm. and 200 mgm. instead of the 500 mgm. the failures were equal for the two drugs and no distinction could be drawn between them. The claim of WANG that bi-weekly doses gave better results than daily doses was not confirmed.

The general conclusion is that in the form of solustibosan a smaller quantity of antimony gives the same result as the same quantity of

neostibosan which contains a larger amount of antimony; that solustibosan is better tolerated by the animals and in intensive treatment gives at least as good results as neostibosan. *C. M. Wenyon.*

ADLER (S.) & BER (M.). **The Transmission of *Leishmania tropica* by the Bite of *Phlebotomus papatasii*.**—*Indian Jl. Med. Res.* 1941. Oct. Vol. 29. No. 4. pp. 803–809. With 3 figs. on 1 plate.

In this paper the author describes transmission experiments in which he employed laboratory-bred sandflies (*Phlebotomus papatasi*) infected with *Leishmania tropica* by feeding through a membrane on a suspension of washed flagellates in a mixture of three parts of 2·7 per cent. saline and one part of inactivated defibrinated rabbit blood. After feeding, the sandflies were kept in an incubator at 30°C. in test tubes plugged with slightly moistened cotton wool. They were taken out from time to time and fed on an individual who had recovered from oriental sore. Finally, feeds on susceptible volunteers were undertaken. A large number of transmissions were effected, as shown in the following table:—

Table showing the results of feeding on five volunteers.

Volunteer number	Number of infected sandflies fed	Total number of individual feeds	Total number of lesions produced
1	2	2	1
2	9	11	18
3	5	14	6
4	15	17	1
5	3	3	2

N.B.—The number of individual bites is considerably greater than the number of individual feeds.

It is pointed out that in these experiments transmission was accomplished with almost ridiculous ease as compared with previous attempts. Thus, as recorded in an earlier paper by ADLER and THEODOR [this *Bulletin*, 1929, Vol. 26, p. 748] 253 infected sandflies were re-fed repeatedly on 12 volunteers and a puppy. One volunteer developed oriental sore on a site on which sandflies had fed but the experiment was regarded as inconclusive, as the individual had resided during the experiment in a locality where a number of cases of oriental sore had been detected. Other (unrecorded) unsuccessful experiments were carried out subsequently. Observations on the development of *L. infantum* in *P. perniciosus* showed that flagellates were deposited by sandflies into any medium on which they fed if the distal part of the epipharynx were infected. It remains to be determined, therefore, what are the conditions necessary to bring about infection of the epipharynx. The successful experiments reported in this paper differed from previous unsuccessful ones in that the sandflies were kept at a uniform temperature of 30°C. and imbibed a suspension of flagellates in a fluid with a higher salt content. Whether these factors are responsible for the successful results cannot be stated at present.

A significant observation was made near the Dead Sea where, in a recent settlement, 90 out of 120 settlers contracted oriental sore in

nine months. There the soil has a high salinity level, which must have an influence on the larval stages of the sandfly. In the more northern parts of the valley, where the salinity is lower, oriental sore is rarely met with. *C. M. Wenyon.*

FEVERS OF THE TYPHUS GROUP.

GROOT (Hernando). Investigaciones con el virus del tifo exantematico en Nariño. [**Investigation of the Virus of Typhus Fever in Nariño (Colombia).**]—*Rev. Facul. de Med.* Bogota. 1941. Oct. Vol. 10. No. 4. pp. 321–324.

The virus of this disease, of which twenty cases have already been described by the author and his colleagues, has now been investigated; it has been found to be non-orchitic and to correspond with the virus of classical (louse-borne) typhus fever.

Among 150 guineapigs only one showed a slight and fleeting orchitic reaction; the incubation period in animals of the first passage was usually from 12 to 18 days. In one case it was only six days. The virus died out after seven consecutive passages in guineapigs. Suspensions made from lice collected from a patient in the acute stage of the disease were infective to guineapigs. *John W. D. Megaw.*

MENK (W.). Kurze Bemerkung zu Versuchen der Eubasinumbehandlung bei Flecktyphus. [**The Treatment of Typhus with Sulphapyridine.**]—*Klin. Woch.* 1942. Feb. 21. Vol. 21. No. 8. p. 185.

Sulphapyridine has been used in the treatment of typhus in Warsaw since early 1940, especially in relation to the complications, of which the most common and dangerous is pneumonia due to secondary bacterial invasion. On the whole the results have been favourable, and the impression has been gained that the drug tends to prevent pneumonia, but there is no evidence that sulphonamides influence typhus itself. Of 24 sulphonamide preparations tested, WOHLRAB found only one, 4′-sulphonamide-2,4-diamino-azobenzyl-6-carbonic acid, to have any effect on infection of mice with *Rickettsia mooseri*, and TOPPING [this *Bulletin*, 1940, Vol. 37, p. 264] reported adversely on prontosil and sulphapyridine in experimental Rocky Mountain fever and endemic typhus in guineapigs. These results support the view that sulphonamides are not useful in uncomplicated typhus.

The author makes reference to encouraging reports given by MÜHLENS on treatment with Novasurol, and by GIUNTA and D'IGNAZIO in Abyssinia with mercurochrome and vitamins B_1 and C [this *Bulletin*, 1939, Vol. 36, p. 989; 1940, Vol. 37, p. 257]. *C. W.*

MAGALHÃES (O.) & ROCHA (A.). Tifo exantematico do Brasil (em Minas Gerais). Estudos em fócos da molestia—Molestia inaparente, benigna e grave. [**Exanthematic Typhus (Tick-borne) of Brazil (in Minas Geraes).**]—*Brasil-Medico.* 1941. Nov. 22. Vol. 55. No. 47. pp. 773–777.

Cases are described which illustrate three types of the exanthematic typhus of Brazil. These are: (1) Typical severe attacks, (2) Benign

forms with fever and strongly positive Weil-Felix reactions and, (3) Inapparent forms without fever or other symptoms but with demonstrable virus.

The authors are convinced that there are several distinct strains of the virus; each strain retains its special characteristics after a series of transfers through experimental animals and fails to protect animals from infection with other strains. Another possible explanation of this failure to protect is that the immunity resulting from infection with any given strain is only partial and temporary. One or other of these two hypotheses would explain the occurrence of severe and even fatal attacks in persons who have lived for many years in areas of high endemicity and who, therefore, can hardly have escaped from previous attacks. *John W. D. Megaw.*

TOSTES (José) & BRETZ (Germano). Sobre uma Rickettsiose observada em zona rural do estado do Rio de Janeiro. [**Tick-borne Rickettsial Fever in a Rural Area in the State of Rio de Janeiro.**]—*Brasil-Medico.* 1941. Nov. 29. Vol. 55. No. 48. pp. 789–794. With 4 figs. & 1 map. [20 refs.] English summary.

"Exanthematic typhus" of the Rocky Mountain spotted fever type has already been reported from São Paulo and Minas Geraes in Brazil; fourteen cases have now been reported from a rural area in the adjoining State of Rio de Janeiro. Six of these cases were studied; in five there was a positive agglutination of *Proteus OX19* in the highest titre tested (1–800): in the case of the patient whose reaction was negative the virus was recovered from inoculated guineapigs. In five of the cases guineapigs reacted to blood inoculations in the manner typical of Rocky Mountain spotted fever; scrotal reactions were frequent and Rickettsiae were usually found. Ticks from infected localities were examined but no virus was detected. Four of the six patients died. *John W. D. Megaw.*

DYER (R. E.). **Mass Immunization against Typhus Fever.**—*Ann. Intern. Med.* 1941. Oct. Vol. 15. No. 4. pp. 629–636. [28 refs.]

This is yet another critical survey of the methods of immunization against typhus fever which are likely to be useful on a large scale.

Typhus fever is referred to in the paper as a disease transmitted in nature from rat to man by fleas and from man to man by lice. No mention is made of the related diseases conveyed from animals to man by ticks and mites. It is theoretically possible that flea-borne typhus may become epidemic through the agency of the body louse, but such an event apparently has not occurred in the U.S.A. where the prevention of the flea-borne disease is chiefly a matter of rat control. [It appears to have occurred in Mexico and Shanghai, see this *Bulletin*, 1939, Vol. 36, p. 994; 1940, Vol. 37, p. 256.]

The methods of immunization by living virus are described; the chief of these are the procedures associated with the names of Laigret and Blanc, both of which involve the use of murine (flea-borne) virus. Although these appear to confer immunity when their use is followed by an attack of the disease, they may give rise to severe reactions in Europeans and they are not recommended if some safer vaccine can be found.

Of the methods in which killed virus is used Weigl's vaccine is the oldest, but it is too cumbersome for large-scale production. The killed vaccines of Cox and Castaneda can be produced in quantity and, from available results in animals, give promise of producing immunity in man. Experimentally, Castaneda's vaccine has been shown to protect man against subsequent inoculation with infective material.

Final judgment on the values of the latter two vaccines cannot be passed till they have been tried under controlled conditions in epidemics. The Cox vaccine is now on trial in Rumania, Hungary, Spain and China.

A brief outline of the most recent methods of preparing the above vaccines is as follows :—Laigret and Durand now use the brain substance of mice infected with murine virus ; this is mixed with egg yolk and dried. Stored at low temperatures it remains infective for three months. The preparation is suspended in olive oil for a short time before use. Blanc and Baltazar now use the dried excreta of fleas infected with murine typhus ; these remain infective for two years. Suspensions are made and ox bile is added to the extent of five per cent. of the volume 15 minutes before use. Weigl's killed vaccine is prepared by inoculating lice per *rectum* with suspensions of *Rickettsia prowazeki* ; the insects are then fed on immune persons for several days, their intestines are dissected out and triturated in carbolized saline. About 100 lice are needed to provide vaccine for each person. Cox incubates fertile eggs for six or seven days, injects the virus into the yolk sac and incubates the eggs till the death of the embryo, which usually occurs within five to seven days. The tissues are washed in saline and ground with alundum. The mixture is made up to " a ten per cent. suspension of saline containing formalin." [See this *Bulletin*, 1942, Vol. 39, p. 381.]

A vaccine prepared in this way with *R. prowazeki* protects guineapigs against the homologous strain.

Castaneda has shown that the *R. mooseri* of flea-borne typhus can be obtained in large numbers from the lungs of rats and mice inoculated by the intranasal route and that formolized suspensions of these organisms protect guineapigs and human volunteers against infection with the same strains. Durand and Giroud have shown that vaccines made from *R. prowazeki* can be prepared in the same way.

John W. D. Megaw.

Correction.

The following note has been received from Sir John Megaw.

" In my comment on the paper by Buchwald, this *Bulletin*, 1942, Vol. 39, p. 137, I suggested the need for an investigation into the possibility of non-specific rises in the titre of the Weil-Felix reaction in cases of non-rickettsial fevers in which the sera of the patients already reacted in dilutions of 1–25.

" It has been brought to my notice that A. Felix has already investigated this question. In a paper in the *Journal of Hygiene*, 1929, pages 434 to 445, he gave a number of examples of cases of typhoid and other non-rickettsial diseases in which Weil-Felix titres ranging from 1–50 to 1–200 remained constant during periods of observation which extended, in some patients, over several weeks.

" It is regretted that these important findings were not known to me."

YELLOW FEVER.

HUGHES (T. P.), JACOBS (H. R.) & BURKE (A. W.). **A Survey of Yellow Fever Immunity in Uganda.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1941. Nov. 29. Vol. 35. No. 3. pp. 131–142. With 2 maps. [11 refs.]

The report of a survey undertaken by members of the Rockefeller Foundation with the co-operation of the Uganda Government, to determine a more precise delimitation of the zone of yellow fever immunization in the Uganda Protectorate and the neighbouring territories.

The results of testing 3,941 specimens from 49 different localities in the Uganda Protectorate are shown on a map and also given in tabular form. The eastern, central, and south-western regions show no evidence of previous or present infection with yellow fever, no immunity being found among children up to 14 years old, and only in rare isolated cases among adults. In the northern region an appreciable degree of immunity was found among children and adults, which, however, may be a reflection of travel into infected areas, or of isolated infections.

In western Uganda sera were collected from Bunyoro and Toro Districts. The former showed an immunization rate of 1·7 per cent. in children and 2·4 per cent. in adults. In Bwamba county, Toro District, bordering the Belgian Congo, 109 out of 1,231 sera were positive, a percentage of 8·9, but the sera from those regions bordering the Ituri Forest gave an immunization rate of 22·6 per cent. This suggests the existence of a continuing yellow fever infection, possibly endemic in character, but even in this area extensive investigation over a period of three years has failed to reveal an active case of the disease.

E. Hindle.

FINDLAY (G. M.), KIRK (R.) & MACCALLUM (F. O.). **Yellow Fever and the Anglo-Egyptian Sudan: Distribution of Immune Bodies to Yellow Fever.**—*Ann. Trop. Med. & Parasit.* 1941. Dec. 31. Vol. 35. No. 2. pp. 121–139. With 2 maps. [15 refs.]

A detailed account of the distribution of yellow fever immunity in man and animals in the Anglo-Egyptian Sudan, based mainly on the results of mouse protection tests carried out respectively in the Nuba Mountains 1935–1938, in the Fung area 1937–1938, and a general survey in 1941.

The results are given in tabular form and also on maps and should be consulted in the original by those interested. During 1941 positive protection tests were obtained with sera collected from Rahad in Kordofan, two towns in the Equatorial Province, and Umm Berembeita in the Nuba Mountains. In each case only one serum was positive. The presence of two infected towns in the Equatorial Province adjoining Abyssinia suggests the possibility that the disease had extended into that country. As a result of this and previous surveys, the yellow fever endemic area is found to comprise a region bordered on the north by the southern edge of the Sahara from Geneina to El Fasher in Darfur; the border then dips southwards through the southern two-thirds of the Nuba Mountains, crosses the White Nile

between Kaka and Jebelein, and proceeds through Dar Fung to the Abyssinian border. It is probable that in this region the endemic area extends at least as far as the edge of the Abyssinian plateau. On the south and west the Sudanese endemic area merges with those of Uganda, the Belgian Congo and French West Africa.

Positive reactions have also been obtained with the sera of primates and certain domestic animals in the Sudan. In the Nuba Mountains, 4 out of 16 cows, 2 of 3 dogs, and 3 of 8 pigs were positive, and 3 goats, 4 sheep and 6 hens negative.

The true significance of the results in domestic animals is still obscure, for positive reactions have been obtained in non-endemic yellow fever areas. *E. Hindle.*

MAHAFFY (A. F.), HUGHES (T. P.), SMITHBURN (K. C.) & KIRK (R.). **The Isolation of Yellow Fever Virus in the Anglo-Egyptian Sudan.**—*Ann. Trop. Med. & Parasit.* 1941. Dec. 31. Vol. 35. No. 2. pp. 141–148.

An account of the isolation of two strains of yellow fever virus from patients in the Nuba Mountains, who both suffered a mild attack of the disease.

The blood was collected from the patients by a vacuum venule and 0·03 cc. of the serum injected intracerebrally into each of a group of 5 or 6 white mice. The pathogenic properties of the two strains obtained were studied in mice and rhesus monkeys. Out of 17 monkeys, 6 died with typical lesions and 11 survived and became immune. The two strains of virus were found to be identical with strains isolated in other parts of the world. *E. Hindle.*

MARSCHALL (F.). Die histologischen Leberveränderungen bei experimentellem Rift-Valley-Fieber und ihre Beziehungen zur Gelbfieberpathologie. [**The Histological Changes of the Liver in Experimental Rift Valley Fever and their Relationship to the Pathology of Yellow Fever.**]—*Arquivos do Inst. Biol.* São Paulo. 1940. Vol. 11. pp. 215–220.

A general discussion of the pathology of Rift Valley fever with special reference to its relationship to yellow fever.

The author calls attention to the changes in the liver of mice and hamsters infected with Rift Valley fever, in which marked congestion of the capillaries occurs and red cells occupy lacunae in the liver cells. The presence of these erythrocytes, however, is not the result of primary haemorrhage, but only secondary, following upon cell necrosis.

There are striking similarities to the pathology of yellow fever. The Councilman bodies resulting from scattered necrosis may dominate the picture in both infections, and the intra-nuclear inclusions are also similar. The two infections also resemble each other in the size of the virus particles and general biological features.

In spite of these similarities, however, there is little danger of the diagnosis of yellow fever being complicated during the examination of specimens of liver obtained by viscerotomy, since Rift Valley fever has a very restricted distribution and in man produces only a mild infection. *E. Hindle.*

KIRK (R.), CAMPBELL (R. T.) & CHARLTON (R.). **Yellow Fever Infection as observed in Europeans in the Nuba Mountains, Anglo-Egyptian Sudan.**—*Ann. Trop. Med. & Parasit.* 1941. Dec. 31. Vol. 35. No. 2. pp. 113–120. With 2 charts. [10 refs.]

A record of five cases of yellow fever among Europeans in the Nuba Mountains district of the Anglo-Egyptian Sudan, and clinical descriptions of three of them.

All these cases ended in recovery and in this district there are no records of Europeans having died from an illness resembling yellow fever. This supports the observation that mild cases of the disease may occur under natural conditions, for three of the above were acquired during the course of an epidemic in which fatal cases occurred among Africans.

E. Hindle.

FINDLAY (G. M.) KIRK (R.) & LEWIS (D. J.). **Yellow Fever and the Anglo-Egyptian Sudan: the Differential Diagnosis of Yellow Fever.**—*Ann. Trop. Med. & Parasit.* 1941. Dec. 31. Vol. 35. No. 2. pp. 149–168. With 1 map & 2 plates. [33 refs.]

The difficulty in diagnosing yellow fever in the field by clinical means is well illustrated by the present account of two epidemics, not of yellow fever, but associated with jaundice and black vomit, occurring during 1940 in the Tagoi Hills and in and around El Obeid, at the same time as yellow fever was present in other parts of the Province of Kordofan.

The clinical symptoms of the two epidemics are based on 33 cases, three of which were fatal. The following is a summary of the principal symptoms of these 33 patients studied in detail :—

Fever 33		Epistaxis 11	
Headache 33		Vomiting 11	
Jaundice early 10	25	Black vomit 3	
,, late 15		Haemorrhage from bowels 4	
Backache 20		Residual enlargement of liver 4	
Pains in limbs 18		Epigastric pains 2	
Diarrhoea 12			

The urine contained albumen in addition to bile. Differential blood counts showed polymorphonuclear leucocytosis. No malaria parasites were found, but in two patients whose blood was examined at the height of the fever, spirochaetes were present.

Careful experimental investigations excluded the possibility of yellow fever and after a discussion of all the possibilities the authors bring forward evidence to show that relapsing fever and infective hepatitis, in addition to yellow fever, were present in epidemic form in Kordofan Province during 1940.

In view of the various diseases in the tropics that may produce jaundice accompanied by black vomit, it is obvious that laboratory procedures are essential for the rapid and accurate diagnosis of yellow fever, and in countries where it exists, or may spread, laboratories should be equipped to carry out the isolation of the virus by inoculation into susceptible animals, the histological investigation of liver sections from fatal cases, and mouse protection tests on the blood.

E. Hindle.

HARGETT (M. V.). Les moustiques dans les aéronefs. [**Mosquitoes in Aircraft.**]—*Bull. Office Internat. d'Hyg. Publique.* 1941. May–June. Vol. 33. No. 5–6. pp. 279–287. [15 refs.]

The prevention of the carriage of mosquitoes by aircraft is important in America because of the existence of yellow fever in South America and the presence of *Anopheles gambiae* in a restricted region in Brazil. In this paper the author reviews the various methods of destroying mosquitoes in aircraft, methods of screening, the relative advantages of spraying aircraft before, during, and after flight, and he describes the methods that have been used in recent years on the routes from South America to Miami (Florida) and the results of inspections of aircraft on arrival at Miami. The insecticide used is an extract of pyrethrum in "deobase oil" (with a flash point of 79°C.), with which there is no danger of fire, containing 0·4 per cent. of total pyrethrins. This is atomized at the rate of 20 cc. per 1,000 cubic feet, while the aircraft is in flight. Ventilators are closed; cupboards, drawers, holds of baggage, etc., are opened and remain so for at least five minutes after atomization is completed. Where spraying is carried out on the ground, better results can be obtained by the use of heavier power-driven spraying apparatus. If experienced fumigators are available, hydrogen cyanide at the rate of 6 ounces per 1,000 cubic feet may be employed for vacant aircraft. Inspection of 398 aircraft on arrival at Miami from regions south of Cuba during 1938 resulted in the discovery of five living mosquitoes which had survived the standard pyrethrum spraying in five different aircraft.

V. B. Wigglesworth.

CHOLERA.

BENGAL PUBLIC HEALTH REPORT FOR YEAR 1939 [CHATTERJI (A. C.), Director]. pp. 35–47. With 6 figs. (2 maps).—[**Cholera.**]

Cholera incidence definitely receded in 1939, as is shown by the 33,221 deaths of that year against 71,133 deaths in 1938. These totals represent death rates of 0·7 and 1·4 per mille respectively. Preventive measures have been mainly inoculation and disinfection for the active disease. Improvement of rural water supplies is taken to be the most important of permanent anticholera measures. It is very necessary that, in making schemes for water supply, attention should be paid to the simultaneous adoption of drainage schemes "to obviate the risk of the stagnation of waste water providing fresh causes of malaria and water-borne diseases."

W. F. Harvey.

VENKATRAMAN (K. V.) & RAMAKRISHNAN (C. S.). **A Preserving Medium for the Transmission of Specimens for the Isolation of** *Vibrio cholerae.*—*Indian Jl. Med. Res.* 1941. Oct. Vol. 29. No. 4. pp. 681–684.

The sending of stools to a district laboratory for such an essential diagnosis as cholera is a difficult matter, because the cholera vibrio is apt to die out during transit. Various methods have been tried

out to get over the difficulty. That which is proposed here, and which has been tried in the field, is the use of a buffered sea salt solution as a preserving medium. The solution is prepared as follows :—

" 12·405 g. boric acid . . and 14·912 g. potassium chloride . . are dissolved in about 800 cc. of hot distilled water, the solution cooled and made up to 1 litre. From this stock solution 250 cc. are taken, mixed with 133·5 cc. of M/5 NaOH and the whole made up to a litre. Twenty grammes dried sea-salt (common salt from the bazaar serves equally well) are dissolved and the buffered saline filtered through paper, dispensed in 10 cc. quantities in 1-oz. screw-capped bottles and sterilized in the autoclave. The sterilized buffer has a pH of 9·2 and is found to maintain the same pH for months."

In use a spoonful (1–3 gm.) of stool is well mixed in the buffered solution and despatched to the laboratory by post.

Satisfactory trials were made with artificially infected stool from which specimens were daily enriched in Read's mannose-bismuth-sulphite modification [this *Bulletin* 1939, Vol. 36, p. 894] of Wilson and Blair's medium, and then plated. Vibrios were found to remain viable for as long as 62 days. In a trial of samples from a proved case of cholera, isolation of *V. cholerae* was effected up to 92 days after collection, " when the specimens were exhausted." A field trial was instituted : " sixty-six specimens including a specimen of vomit, were taken from 60 cases. *V. cholerae* was isolated from 64 specimens in the field and from 60 in the laboratory." *W. F. Harvey.*

i. Tomb (J. Walker). **Collapse and Renal Failure.**—*Med. Jl. Australia.* 1941. Nov. 15. 28th Year. Vol. 2. No. 20. pp. 569–570. [14 refs.]

ii. Medical Journal of Australia. 1941. Nov. 15. 28th Year. Vol. 2. No. 20. p. 573.—**The Crush Syndrome.**

i. The author quotes various authorities to support the view that the essential factor in the development of the late effects of shock (such as are observed in crush injuries) is renal failure due to lack of oxygen supply to the renal tubules, which, after a time, becomes irremediable. A similar condition has long been observed in cholera, in which anuria may persist after successful restoration of the circulation by saline infusions. Here again there is irreparable damage to capillary and tubular epithelium, due to lack of oxygen consequent upon the state of shock produced by the disease. He argues that the treatment of collapse of the circulation from any cause should include the free and uninterrupted exhibition of oxygen.

ii. In the editorial are presented the two theories of the causation of renal failure in crush injuries ; first that it may be due to dehydration from loss of fluid to the injured limb, and should therefore be treated by replacement methods and intermittent pressure on the injured limbs, and second that it may be due to haemolysis from the release of a tissue haemolysin by the injury, with the accumulation of acid haematin in the renal tubules, and should therefore be treated with intravenous salines and with alkalis *per os.* *C. W.*

Chopra (R. N.), deMonte (A. J. H.) & Chatterji (B. C.). **Sulphanilylguanidine in Cholera.**—*Indian Med. Gaz.* 1941. Dec. Vol. 76. No. 12. pp. 712–713.

Sulphanilylguanidine, sulphaguanidine for short, is a sulphonamide derivative " distinguished from allied compounds by reason of its solubility in water and low absorbability from the gastrointestinal

tract." It has been used with good effect in dysentery. The mortality in a series of 218 cholera patients receiving 1 gm. initial dose and maintenance doses of 0·5 gm. every 6 hours for 72 hours was 3·21 per cent. as against one of 6·38 per cent. in 94 controls receiving saline perfusion only. In the present cholera trials the dosage used was low and further improvement might be obtained by increasing the dose. The control series is not a perfect one inasmuch as 20 clinically positive cases showed no mortality at all. When, however, the figures are taken for culturally positive cases the percentages for 54 sulphaguanidine patients and 67 saline perfused patients were 3·70 and 8·97 respectively. The drug was not found to be toxic to human beings in the doses used; "sulphaguanidine-treated cases passed fewer stools per day and required less intravenous saline." *W. F. Harvey.*

YAWS.

NÁJERA ANGULO (Luis). Sobre un caso de gundu en la Guinea Española. [**A Case of Goundou in Spanish Guinea.**]—*Rev. Med. Trop. y Parasit.* Habana. 1941. May–June. Vol. 7. No. 3. pp. 54–56. With 1 fig.

Judging from statements in text-books we would regard goundou as fairly common, especially in West Africa, and it has been recorded in East Africa, Malaya, Java, Sumatra, China and the West Indies. It comes as a surprise, therefore, to find the author commenting on its "extraordinary rarity" in Fernando Po. He quotes BOTREAU-ROUSSEL and CLERC as saying that they saw only one case among 10,000 examined, and he personally seems to have seen only this one among 16,000.

The patient was a man of 20 years who had been working in Fernando Po for 10 months. He came to hospital suffering from trypanosomiasis, but when first coming under observation the goundou was apparent. He was cured of his trypanosome infection in Santa Isabel, but the goundou was unaffected in spite of the administration of arsenicals. The question of its relation to yaws is debated. *H. H. S.*

GUTIERREZ (P. D.), NAVARRO (R. J.), MORALES (S. B.), LOZANO (A. A.) & GOMEZ (F. B.). **Wassermann Reaction of the Cerebrospinal Fluid in Yaws.**—*Acta Med. Philippina.* 1941. July–Sept. Vol. 3. No. 1. pp. 1–19. With 3 figs.

From time to time a few investigations have been made in regard to possible pathological changes in the cerebrospinal fluid in cases of yaws. One hundred and forty-five cases of yaws treated at the Philippine General Hospital were specially selected to exclude syphilis. In none was the W.R. with the c.s.f. positive; the cell count in all 122 cases examined was normal; the Pandy test was slightly positive in one of 116 cases examined; total protein was normal in 53 cases in which estimations were made; the colloidal gold test was similarly negative in 29 cases tested. The total 145 comprised two cases of primary, 42 secondary and 101 tertiary yaws.

[It would have been more interesting had there been a much larger group of earlier cases and had the c.s.f. been examined at intervals as there is some evidence that a temporary reaction in the c.s.f. may occur.]

H. S. Stannus.

LEPROSY.

i. Greval (S. D. S.), Chandra (S. N.) & Das (B. C.). **A Note on Complement-Fixation Test in Leprosy and Kala-Azar with Witebsky, Klingenstein and Kuhn (W.K.K.) Antigen.**—*Indian Med. Gaz.* 1941. Aug. Vol. 76. No. 8. pp. 474–475.

ii. ——. **Lesser Knowledge of Human Tubercle Bacillus ; Serological Affinity with Allergic States, Variation in Content, etc.**—*Ibid.* 1941. Oct. Vol. 76. No. 10. pp. 610–611. [19 refs.]

iii. Lowe (John). **A Note on Complement-Fixation Test in Leprosy and Kala-Azar with Witebsky, Klingenstein and Kuhn (W.K.K.) Antigen.** [Correspondence.]—*Ibid.* pp. 637–638.

i. The authors have tested the reactions with Witebsky, Klingenstein and Kuhn antigen in leprosy and kala azar. The antigen used is essentially a solution in benzol of the alcohol-insoluble, pyridin-soluble and acetone-insoluble fraction of the human tubercle bacillus. The residue, after evaporation of the benzol, is suspended in normal saline and standardized. The essential features are that the dose of the antigen is linked to the haemolytic system and is not complementary and that the reaction is linked to the Wassermann reaction and is put up only when a complement of optimal reaction and titre for the latter reaction is available. The Wassermann reaction is put up at the same time, with the same relationship between the serum dilution, the antigen and the haemolytic system. A 1 in 25 dilution is now used in both leprosy and kala azar. Positive reactions are clear-cut and are obtained in early cases of nodular leprosy and also in early kala azar before the formalin test is positive. In neural leprosy the aid given is not of a high order.

ii. This paper covers much the same ground as that above. The author emphasizes the point that the test gives stronger reactions in kala azar than it does in leprosy. The degree of fixation of complement in kala azar is comparable with that obtained in the Wassermann reaction in secondary syphilis. In preparing the WKK antigen from tubercle bacilli cultivated by A. C. Ukil in India, the fraction obtained appears to be two to three times as great as that obtained from bacilli found in Europe. The author raises various points for further investigations and concludes that the auto-antibodies formed in tuberculosis, leprosy, kala azar and syphilis show associations, close and remote.

iii. Lowe disputes the claim made in Greval's earlier paper that the serum test is a better and safer test for kala azar and leprosy than others in use. Tests made by Lowe and his colleagues of WKK antigen in leprosy gave very different results from those of Greval ; they indicate that this antigen is of very little use in the diagnosis, prognosis and epidemiology of leprosy.

L. Rogers.

PALDROK (A.). **Results of Specific Therapy of Leprosy in Estonia during Last Twenty Years.**—*Acta Med. Scandinavica.* 1941. Aug. 26. Vol. 108. p. 374. [Summary taken from *Jl. Amer. Med. Assoc.* 1942. Jan. 3. Vol. 118. No. 1. pp. 89–90.]

Paldrok observed that the causal organism of leprosy consists of granules that are surrounded by an envelop ; five or more are generally in one sheath. The common envelop creates the appearance of a rod which Amauer Hansen had designated as the bacillus of leprosy. Paldrok observed, however, that the multiplication of these rods is not like that of bacilli but that the granules adhere to the wall, then penetrate the envelop and develop into dentritic forms as do fungi. He became convinced that the causal organism of leprosy is not a bacillus but rather a fungus and that this explains why the leprosy organism does not grow in cultures suitable for bacilli. He found also that the granules and the covering differ in their chemical composition. Whereas the granules contain free nucleic acid, the envelop contains nucleoproteins. Searching for a substance that would destroy the covering so that the granules could be reached, he decided to utilize the action of cold in the form of solid carbon dioxide. Rods of solid carbon dioxide are pressed against the leproma for three to four seconds. Lepromas of millet seed size completely disappear about three weeks after the freezing, but with larger ones the freezing must be repeated. At each session fifteen to twenty lepromas are frozen, and the procedure is repeated every two weeks. After four months, the treatment is interrupted for the same length of time. The decomposition products released during freezing are absorbed by the organism and cause the formation of antibodies. There are indications that the solid carbon dioxide treatment is an autoimmunization. The favorable effect of solid carbon dioxide on leprosy has been corroborated by investigators of many different countries. If after two years of treatment with solid carbon dioxide the organism has lost its responsiveness to the substance a new chemotherapeutic stimulus must be employed, and the author found the organic gold preparation solganal effective. In the course of treatment with solganal the organism regains its responsiveness to solid carbon dioxide, so that the two treatments can be used alternately. Good food, a hygienic mode of life, adequate exercise and weekly sweat baths are complementary measures. Those who are apparently cured are kept in the leprosarium for an additional two years. For the first five years after discharge the patients must submit to control examinations every six months. After pointing out that non-specific shock therapy has largely failed in leprosy, the author says that the efficacy of the solid carbon dioxide and gold (solganal) treatment is proved by the fact that, whereas in 1920 the total number of patients with leprosy in Estonia was 316, by 1940 there were only 113.

ARAUJO (H. C. de Souza). A anatoxina difterica na lepra. [**Diphtheria Toxoid in Leprosy.**]—*Brasil-Medico.* 1941. Nov. 8. Vol. 55. No. 45. pp. 750–751.

Dr. Collier having reported to Dr. Muir that he had obtained unexpectedly good results in leprosy from the intramuscular injection of diphtheria anatoxin in doses of 0·5 cc. every two weeks, increasing by the same amount to a maximum of 2 cc., Dr. Muir requested the author to make trial of it in lepers in Brazil. He in turn passed on

the request, together with a supply of anatoxin, to Dr. José Marianno at Belo Horizonte. The anatoxin had been prepared at the Oswaldo Cruz Institute, some more was obtained from the Institute at Butantán.

In February 1942, Dr. Marianno [the name is spelt with one "n" or two impartially in this article] reported on three patients with lepromata who had undergone anatoxin treatment for 6 months. (1) With many bacteria in the nasal secretion and in the ear lobules, showed no organisms after three series of ten injections. (2) Similar but apparently more advanced—marked reduction in bacteria and general condition much improved. (3) Nasal bacteria, lobules affected and cutaneous infiltrations—much improved, fewer bacteria.

Reference is next made to the wonderful results claimed by COLLIER for this form of treatment [this *Bulletin*, 1941, Vol. 38, p. 704]. The author then gives brief notes of eleven patients, of ages ranging between 25 and 55 years and refers to 21 others who were given the anatoxin together with intradermal infiltration of Chalmoethyl [? Chaulmoethyl]. There is no need to detail each of these; the results are not very good and the author concludes that at his hospital he could not confirm the good reports from the use of diphtheria anatoxin. "The cutaneous symptoms showed little improvement and in some cases became worse, after 6 to 13 months treatment. In half the time he obtained better results from the usual treatment with chaulmoogra and physiotherapy." The neuritis is ameliorated by anatoxin, but vitamin B_1 is equally efficacious. He adds that, as the request has been made by Dr. Muir, the trials with anatoxin will be continued. [See also this *Bulletin*, 1942, Vol. 39, p. 231.] *H. H. S.*

HELMINTHIASIS.

EGAN (E.). **Hookworm Ova: Simple Flotation Technique.**—*Jl. Malaya Branch Brit. Med. Assoc.* 1941. June. Vol. 5. No. 1. p. 55. With 1 fig.

The faeces container is cylindrical, ¾ inch in diameter and 1 inch in height. It is filled with faecal emulsion and placed in a wooden

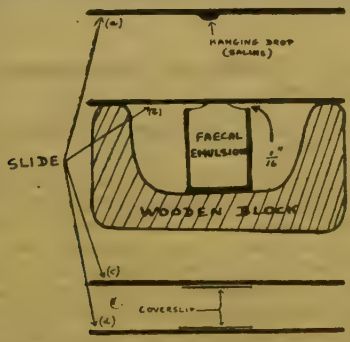


Diagram to illustrate the use of an outer wooden container, of slightly greater depth than the faeces container, to facilitate the taking of hanging drop preparations.

[Reproduced from the *Journal of the Malaya Branch of the British Medical Association.*]

container excavated to a depth just greater than ¾ inch. The emulsion is made with saturated solution of common salt and when the faeces container is in position, more salt solution is added from a pipette until the surface is slightly convex. A slide with a drop of salt solution is inverted over the faeces container and rests on the wooden container so that contact is made between the hanging drop and the faecal emulsion. This is left for 15 minutes, after which the slide is lifted off and lowered on to a coverslip. The preparation may then be turned right side up without fear of mishap. The illustration explains the apparatus. *C. W.*

MARTIN (Gustav J.), THOMPSON (Marvin R.) & ACCOUSTI (N. J.). **Therapeutic and Prophylactic Detoxication. Anthelmintics.**—*Amer. Jl. Hyg.* 1941. Sept. Vol. 34. No. 2. Sect. D. pp. 23–35. [31 refs.]

Experiments were carried out by producing acute poisoning with the anthelmintics, of 4,000 mice weighing 18 to 24 grammes each. In general, the process of detoxication follows three lines—oxidation, reduction and conjugation ; but at present only conjugation can be used to facilitate detoxication, and this may be done to render harmless either poisons produced by parasites in the host or those given to the host to kill the parasites. The mechanism of conjugate detoxication is one of enzymatic action, and in this the concentration of the substrate is a vital factor, and is the single factor, influencing the speed of the reaction, which can be altered.

"Ascaridole, aspidium and tetrachlorethylene represent groups of toxic chemicals used as anthelmintics. In acute toxicity experiments, it has been found possible to decrease markedly the toxicity of these substances by the concomitant administration of certain physiological detoxifying agents : ascorbic acid, glycine, glucuronic acid and cystine (sulfur-containing amino acid). When the detoxicants are given simultaneously, the anthelmintic activity is affected adversely in the case of ascaridole, while in the case of tetrachlorethylene enhancement is observed. In therapeutic practice, the administration of the detoxicants, somewhat after the administration of ascaridole, would avoid interference with the anthelmintic effectiveness."

Clayton Lane.

HUBBLE (Douglas). **Toxicity of Phenothiazine.**—*Lancet.* 1941. Nov. 15. pp. 600–601.

"Phenothiazine is probably too dangerous a remedy to be used in the routine treatment of threadworms."

Hubble starts from MANSON-BAHR's advice [this *Bulletin*, 1941, Vol. 38, p. 516] that for threadworms this drug should be given in considerable dose, refers to reports of over 30 cases in which it has proved effective against threadworms, and mentions the work of DEEDS, STOCKTON and THOMAS (*Jl. Pharmacology*, 1939, Vol. 65, p. 353) who reported that three of 19 patients given the drug developed anaemia, indeed in one after 19·9 grammes there was a drop in red cells from 4,410,000 to 1,570,000 and a rise in reticulocytes to 35 per cent. Hubble himself gave the drug to more than 30 children, three of whom developed anaemia, two with toxic hepatitis ; in one red cells fell to 2,900,000 and haemoglobin to 60 per cent. ; in one, with jaundice, the liver enlarged to the umbilicus and was tender. Phenothiazine is very

efficient but its use is that of a potentially toxic drug in the treatment of a trivial infection, and for that justification must be produced, such as the repeated failure of safer drugs. *Clayton Lane.*

SCHMIDT (H.), CHRISTIAN (T. T.) & SMOTHERMAN (W. M.). **Is Phenothiazine Poisonous to Horses ?**—*Jl. Amer. Vet. Med. Assoc.* 1941. Sept. Vol. 99. No. 774. pp. 225–228.

"Until we know where the danger lies [the authors have had several deaths] . . . . . phenothiazine cannot be considered a safe anthelmintic for equidae."

This drug in doses of 60 grammes to mature mares, of 45 grammes to a two-year-old and of 30 grammes to a yearling, gave great improvement ; so their owner asked for treatment to be given to others—seven mares and three colts. The mares, weighing 1,000 to 1,250 lb., were given 60 grammes each, and two of them died after passing red urine, the mucosa of mouth and eyes having a muddy yellow appearance. At necropsy muscles and kidneys were bright brick red with brownish fluid exudate, the spleen was enormously enlarged, dark reddish brown and diffluent. Transfusions saved the others. The same changes occurred in other horses, and during transfusion the blood from the vein was noticed to be tarry.

The drug bought from the same firm varies in colour, a fact not pointing to chemical purity. The authors note that LAPAGE found methaemoglobin in horse blood after a dose of 500 grammes.

In comment Benjamin SCHWARTZ reports that in the treatment of 600 horses, in a dosage of 30 grammes to a 1,000 lb. body weight (0·066 gm. per kilo.), the drug was found safe and efficient.

Clayton Lane.

ORTIZ (Adelmo A.). Cuadros febriles bilharzianos. [**Fever in Bilharziasis.**]—*Gac. Méd. de Caracas.* 1941. Apr. 30 & May 15. Vol. 48. Nos. 8 & 9. pp. 256–263 ; 268–273. With 4 charts.

In the Mansonian infection in Venezuela, fever may occur at the time of invasion and distribution of larvae, or when the infection has become chronic and the liver no longer adequately deals with toxins, or again when intestinal lesions have let bacilli into blood and so into kidneys.

Fever is more frequent in children than in adults and in males than in females ; hepato-splenomegaly was present in 34 per cent. of cases studied, dysentery in 39 ; in 91 per cent. there were other intestinal parasites (Necator, Ascaris, Trichuris and amoebae) ; bronchial signs were present in 34, late fever in 78, early fever which sometimes simulated typhoid in 21 per cent. The fever of invasion responds well to fouadin, the late chronic form to tartar emetic.

Clayton Lane.

AMARAL (A. Dacio F.) & DE LIMA (Plinio). Sobre o encontro de exemplares adultos de "S. mansoni," na cavidade intestinal, em casos de autopsia. [*S. mansoni* **found in the Intestinal Lumen at Autopsy.**]—*Brasil-Medico.* 1941. Mar. 29. Vol. 55. No. 13. pp. 237–240. English summary.

The worms were found at each of 5 autopsies in the sieved and washed contents of the small and large intestine, the material being got by scraping.

The intestines were separately opened, stretched on a board, scraped with a spatula and the scrapings of the mucosa washed and strained through a sieve having 100 meshes to the square centimetre. These worms had never been detected by the authors, as had Necator, Enterobius and Taenia, when washing faeces, so they believe the worms migrated into the lumen after the host's death. [May not worms and mucosa have been scraped off ?] They suggest this scraping as a way to get material for study and as a subsidiary step in post mortem diagnosis. *Clayton Lane.*

TORRES (D. M. Gonzalez). Sôbre um caso de schistosomose intestinal autóctone de santos. Apendicite por "Schistosoma mansoni." [**Appendicitis due to** *S. mansoni.*]—*Arquivos do Inst. Biol.* São Paulo. 1940. Vol. 11. pp. 579–588. With 9 figs. on 5 plates. German summary.

A Portuguese man of 24, a lifelong resident of Santos, Brazil, had symptoms of acute appendicitis calling for removal of the organ; in its cavity were eggs of *S. mansoni.* A typical photograph of the eggs is reproduced, another shows a typical adult male and female in copula in a vein of the mesoappendix. The faeces, first examined 6 days later, showed eggs of *S. mansoni*, Necator and Trichuris as well as *Entamoeba coli* and Blastocystis. *Clayton Lane.*

ESPIN (José). Mielitis producida por huevos de *Schistosoma mansoni.* [**Myelitis caused by Eggs of** *S. mansoni.*]—*Rev. Policlinica Caracas.* 1941. July–Aug. Vol. 10. No. 59. pp. 245–259. With 8 figs. English summary.

A syphilitic and malarial man of 30 died 50 days after paraplegic symptoms set in. Necropsy showed that they had resulted from a reaction to eggs of *S. mansoni* which were present in the dorso-lumbar region of the spinal cord.

The man had had a chancre 8 years earlier. His Wassermann reaction was ++ with the blood and ++++ with the spinal fluid. In the blood no parasites were found, in the faeces no worm eggs; on the urine there is no report. There being retention of urine a catheter was passed daily and the bowel was frequently washed out to relieve constipation. The only lesions found at necropsy were suppuration of the left kidney, an enlarged and soft spleen and some lesions in the cord, and the diagnosis then recorded was cysto-pyelo-nephritis. The only organs kept for microscopic examination were liver and central nervous system. The liver showed slight perivascular lesions, but no bilharzial lesions were recognized there and no adults were seen in the portal system. In the cord the usual changes, reactive to the presence of eggs, lay in the ventral (anterior) half of the cord.

Clayton Lane.

DIÑO (B. R.), DE LEON (W.) & GALVEZ (A. A.). **Schistosoma Japonicum Eggs as a Cause of Appendicitis in Filipinos.**—*Acta Med. Philippina.* 1941. Jan.–Mar. Vol. 2. No. 3. pp. 277–287. With 1 plate.

There are described 14 patients, from the Philippine Islands of Leyte and Samar, suffering from symptoms referable to the appendix.

In two only were schistosome ova found in the faeces before operation, in six only were they found after operation; in all the eggs of

S. japonicum were present in microscopic sections of the excised appendices. Round them were tubercles typical in naked-eye appearance and having the same general microscopic structure as those caused by the tubercle bacillus.

"The deposition of the ova in the appendix wall which induces chronic inflammation resulting in a greater or lesser degree of obstruction of the appendicial lumen accounts for the signs and symptoms of appendicitis. The acute cases are due to secondary infection. In long standing cases the tubercles disappear resulting in extension, scarring, thickening and hardening of the appendix and extensive adhesions around it. These were all seen at the operating table."

All patients made uneventful recoveries and went home freed of the troubles for which they sought treatment. [Is it not possible that, in these instances of chronic appendicular trouble in countries with endemic schistosomiasis, antimony treatment may be at least justifiable before the knife? See this *Bulletin*, 1941, Vol. 38, p. 40.]

Clayton Lane.

AFRICA (Candido M.) & GARCIA (Eusebio Y.). **Anomalous Organ-Localization of *Schistosoma japonicum* in Experimentally Infected Monkeys** (*Maccacus cynomulgus*).—*Acta Med. Philippina.* 1941. Apr.–June. Vol. 2. No. 4. pp. 511–525. With 7 figs on 3 plates.

A preliminary report on finding sexually mature *Schistosoma japonicum* in the inferior vena cava and right auricle in two of four experimentally infected *Macacus cynomolgus*.

One monkey was subjected to skin infection with 744 cercariae, the other with 221. Both died of dysentery. As to the first, 30 worms were got from the portal vein and its chief tributaries, 30 more were squeezed from cut surfaces of the liver; two worms in copula lay in a large fibrinous clot in the right auricle, and an adult male among the chordae tendineae. In the inferior vena cava of the other monkey there were two pairs of adult worms near its junction with the heart, two worms were aspirated from the right auricle by pipette, and histological sections showed others in fibrinous clot in the right ventricle. There were no eggs in brain, kidneys, spleen or heart and few in the lungs. How the worms got to the right side of the heart is dicussed, the authors inclining to the view that they may have left the portal system through a pelvic anastomosis with the systemic veins.

Clayton Lane.

TUBANGUI (Marcos A.) & AGUILA (Pantaleon J.). **The Treatment of Schistosomiasis Japonica with Fuadin.**—*Philippine Jl. Sci.* 1941. May. Vol. 75. No. 1. pp. 69–73.

"1. A total of 19 cases of schistosomiasis japonica were given a complete course of treatment with fuadin. Of that number, 10, 52·6 per cent. were apparently cured. Of the 9 persons who were not cured, 1 had a relapse and 2 were very advanced cases.

"2. As claimed by previous workers, the drug appears to be of value in the treatment of the disease. The suggestion of Khalil that the dose be calculated, not according to the age and weight of the patient, but according to his ability to retain the drug in the body during a reasonable length of time, should be given a trial in order to see whether by so doing the percentage of cures can be increased."

The dosage was that advised by KHALIL and BETACHE [see this *Bulletin*, 1930, Vol. 27, p. 460].

Clayton Lane.

MONTHLY BULLETIN. Manila, P. I. 1940. Oct. Vol. 20. pp. 339–340.—**Notes on the Schistosomiasis Campaign in Surigao, Leyte, and Mindoro.** [Summary taken from *Public Health Engineering Abstr.* Washington. 1941. Sept. Vol. 21. No. 9. p. 35. Signed Crit PHARRIS.]

Surveys of prevalence and geographical distribution of schistosomiasis were made in the provinces of Surigao, Leyte, and Mindoro, during July 1940. The studies included examinations of schoolchildren, collection of the snail, Blanfordia (Oncomelania) Quadrasi, the intermediary host of the parasite, treatment of dispensary cases, examination of blood and stool specimens, and an educational campaign for the prevention of the disease in endemic areas. The prevalence of positive cases was not given for all people examined but in the province of Leyte, 78, or 6·68 per cent., of 1,163 dispensary patients were infected, while in Mindoro, 90, or 9·67 per cent., of 931 examinations in clinics were positive. One hundred and thirty-five positive cases were found in the Maivit Municipality in Surigao.

More males were affected than females and the majority of cases occurred in children from 5 to 15 years, the age groups considered most likely to become exposed to the parasite-infected waters (ponds, canals, creeks, etc.), and to unsanitary homes and surroundings.

The principal clinical findings in cases were skin rashes, fever, chilly sensations, abdominal enlargement with pain and tenderness, enlarged liver and spleen, anorexia, nausea, vomiting, diarrhoea, with tenesmus and bloody mucoid stools, marked anemia, loss of weight, and general weakness. The medical treatment consisted of the administration of Fuadin and Emetine hydrochloride under careful supervision of physicians.

The preventive and control phases of the campaign outlined consisted of personal and group instruction, and measures for the elimination or protection of areas infected with the parasite.

TRELLES (J. O.) & LAZARTE (Jorge). Cisticercosis cerebral. Estudio clinico, histopatológico y parasitológico. [**Cerebral Cysticercosis.**]—*Rev. Neuro-Psiquiatria.* Lima. 1940. Vol. 3. No. 3. pp. 393–511. With 63 figs. [Bibliography.]

The authors report on four cases of cerebral cysticercosis, one of which was diagnosed during life by virtue of a clear history of tapeworm infection followed by atypical convulsive attacks.

Photographs of macroscopic brain sections are clear and striking, showing cysts on the surface and within the brain. Most lay in the cortex or meninges, in three of the four cases cysts lay in a ventricle, in one there was a large cyst in the septum lucidum, in one a cyst in the cerebellum, though this is generally held to be a common site, in none was the midbrain infected. The host's histological reaction arranges itself in three concentric layers, an inner open one of neutrophils and of epithelioid cells including macrophages containing fat and other inclusions, a middle layer of collagenous fibres with plasma cells, an outer layer rich in reticulo-endothelial cells, lymphocytes, plasma cells (particularly well seen in their Fig. 39) and giant cells as well as eosinophils. Within all lies the degenerate parasite, or it may have been absorbed. Surrounding this reaction the arteries show inflammation involving all coats, and all the neuroglial elements and nerve cells show pressure or toxic changes.

Three symptoms overshadow the condition—convulsions, raised intracranial pressure and psychic changes. The first may be preceded by an aura, the second shows itself in violent headaches, vomiting, disturbance of vision with papilloedema, but the psychic changes are the most obvious and have been minutely but variously classified. The changes in cerebrospinal fluid are not always typical; the pressure may be at zero, albumen may register 1 in 1,000, eosinophils, though a distinctive feature, may be absent, deviation of complement may be present or absent and so may the intradermal reaction. X-rays may help when cysts are calcified. Biopsy of a cyst will settle the matter. Surgical treatment guided by localizing symptoms has done good, but the usual multiplicity of cysts does not hold out much hope. Prophylaxis lies in prompt treatment of strobiles and in proper supervision of meat so that cysticerci may not grow to strobiles in man.

Clayton Lane.

BARNETT (L.). **The Incidence of Hydatid Disease in New Zealand.**—*New Zealand Med. Jl.* 1941. Oct. Vol. 40. No. 219. pp. 273–278. [Summary appears also in *Bulletin of Hygiene.*]

During 1940 there were 128 hydatid patients out of 121,255 patients in the Public Hospitals; of these 77 were in North and 51 in South Island. In addition there were 84 hydatid patients in other hospitals. The author gives figures, mostly in five-year periods, for the last 50 years in the Public Hospitals and in general they show a rising incidence. For example, over 1904–1908 there were 315 cases, while in the five years 1934–38 there were 586 cases. The mortality rate is approximately 14 per cent. The incidence of hydatid disease in sheep for the five years 1936–1940 was 44 per cent., with a very similar percentage in cattle. In pigs the incidence is believed to be high but no official data are available. There are about 200,000 dogs in New Zealand and the author estimates from laboratory investigations that about one-third of the country dogs harbour the adult hydatid worm (*Echinococcus granulosus*) in their intestines. In town dogs infection is very rare, the different incidence being due to the fact that they are rarely fed on raw offal, while this is very common with country dogs. The crux of prevention lies in efforts to deal effectively with the country dog. Education and persuasion have been tried very extensively but have so far been comparatively ineffective. The author mentions legislation and enforcement but makes no definite recommendations. Pre-boiling of the offal (if given at all) and suitable tapeworm medicine for the dogs are the main preventatives.

W. G. Savage.

WILHELM (Ottmar). Contribución al estudio de la hidatidosis en Chile. La equinococosis en Concepción. [**On the Study of Hydatid Infection in Chile. The Echinococcus in Concepción.**]—*Rev. Chilena de Hig. y Med. Preventiva.* 1941. Mar. Vol. 3. No. 4. pp. 281–289.

The incidence of Echinococcus infection is alarmingly high in Concepcion, Chile, and needs strong measures to bring it down.

In 1940 there were admitted to Concepcion hospitals 15 patients with hydatid cysts. In the municipal slaughter house 8,920 infected animals were discovered in 1939. The monthly percentages were

highest in cattle (17·97 to 45·28), less high in sheep (0·22 to 21·30), lowest in pigs (0 to 21·06). Infection in local dogs is as much as 38 per cent. Dogs must be rigorously excluded from slaughter houses in future. *Clayton Lane.*

REAY (E. R.). **Hydatid Diseases of the Kidney.**—*Australian & New Zealand Jl. Surgery.* 1941. July. Vol. 11. No. 1. pp. 9–23. With 34 figs.

The paper deals with the development of the typical unicellular cyst, with certain general effects including anaphylaxis, and with the renal infection in various aspects. These last are illustrated by figures : pyelographs and photographs of excised kidney, in certain instances both from the same kidney. It is compiled from the records of the Hydatid Registry of the Australian College of Surgeons and from seven personal cases.

Practical points regarding anaphylaxis are these :—care to prevent soiling of the tissues during operation, this to be performed under general anaesthesia which usually abolishes anaphylaxis, operation unless urgent (and it seldom is in these cases) to be deferred for 14 days if a cyst has ruptured, anaphylaxis to be treated with adrenalin. Interesting pyelograms, some diagrammatic, illustrate (1) how, after the wall of a pelvic calyx and of the adjacent adventitial coat of a hydatid have become absorbed, the opaque fluid may pass outside the true cyst wall and produce a wineglass shadow, an appearance not to be confused with that of a calcified cyst ; (2) how, when the true cyst wall has also been opened, daughter cysts are shown up as clear areas in a general opacity. Such cysts escaping from a mother cyst in the upper part of the kidney may pass down the ureter or may collect in a dependent calyx of the renal pelvis.

Diagnosis is conclusive if hydatid material is passed, presumptive if a smooth rounded lumbar tumour should appear in one enjoying good health. Progress is slow and may pass into inactivity, the cyst may rupture into the urinary passage with possibility of anaphylaxis or bacterial infection ; it may extend beyond the kidney. Operative procedures are nephrectomy, rarely partial nephrectomy, and evacuation of the cyst without or with drainage, reserving the latter for open suppurating cysts in cases where nephrectomy is inadvisable, or where there is any doubt about removal of the parasite having been complete.

Clayton Lane.

MEADE (J. A.) & BARNETT (Louis). **Echinococcus Alveolaris (Alveolar Hydatid Disease), associated with Ordinary Hydatid Cysts of the Liver.**—*Australian & New Zealand Jl. Surgery.* 1941. Apr. Vol. 10. No. 4. pp. 317–327. With 8 figs. [12 refs.]

This case, unique in the New Zealand records of hydatid disease, adds one more to the small but growing list of sporadic instances of *alveolaris* lesions in countries previously supposed to be exempt.

The case history by Meade, shows that this woman, aged 59, had been admitted into the Dunedin Hospital in 1928 with high blood pressure, liver enlarged to 6 inches below the costal arch, hydatid complement fixation test negative. She was re-admitted in 1940, aged 71, with a hard epigastric swelling, hydatid complement and Casoni tests negative. A provisional diagnosis of secondary carcinoma of the liver

was followed by exploratory examination under local anaesthesia. An old hydatid cyst was marsupialized and a piece was taken from the right lobe of the liver where there was a yellowish grey nodulated mass, suggesting carcinoma but thought perhaps to be an unusual hydatid manifestation. Microscopically it consisted of many cyst-like spaces surrounded by cellular infiltration including giant cells, and by fibrosis. On the eighth day she had a left hemiplegia and died two days later.

In his discussion Barnett writes that, as in most sporadic instances of alveolar hydatid, the ordinary and the alveolar types were combined in the same patient. Proof as to whether these are different species would be theoretically possible, if a properly prepared dog were fed on the alveolar parasite (which, however, is usually sterile); but its presence is not usually detected till necropsy, and worm-free dogs are not usually kept ready; the slender and less curved hooklets which are supposed to characterize the alveolar infection may at least be simulated in the ordinary form.

"It will I think be generally accepted that this case is a genuine specimen of a hydatid lesion of the alveolar type superadded to a long-existing cystic form of the disease.

"It is a mixed or transitional form similar to certain other sporadic cases that have been recorded as arising outside the Bavaro-Tyrolean endemic area.

"It supports the theory of the unicists that mutations can occur in the ordinary growth of hydatids and that therefore there is no necessity to postulate the existence of two different species of the *Taenia echinococcus*. In other words, the hydatid parasite is pleomorphic, influenced in its modes of development by differences in terrain. Dew supports the theory held by Posselt that cattle, so prone to hydatid infection in the multilocular form, may be the intermediate hosts responsible for the alveolaris mutation. Dévé argues that this idea does not stand investigation.

"The microscopic structure of the alveolaris lesion is quite like that of an infiltrating malignant growth sometimes with metastatic extensions to glands and to distant organs, lungs, brain *et cetera*.

"The records suggest as a possibility that, to begin with, the patients may harbour for many years hydatid cysts of the ordinary type, and that the alveolaris lesions are superadded as the patients come to middle or old age. This may indicate a malignancy mutation due to the influence of something corresponding to a carcinogenic factor. The absence or poor development of the protective hyaline ectocyst in the infiltrating micro-vesicles and the consequently unrestrained urge of the germinal membrane or endocyst, to which Dew has called attention, are also suggestive of malignancy.

"The alveolaris hydatid grows and expands only by exogenous buddings and extrusions of germinal membrane. Growth, though slow, is unchecked, relentless, fatal. There is never cessation, walling off, obsolescence as sometimes occurs with benign hydatids. The central part of the mass sooner or later undergoes necrosis, liquefaction and cavity formation. This, I think, heralds the end of the patient's life.

"Prognosis as regards cure is just hopeless, though in the absence of metastases, as in the New Zealand case, life may be maintained in fair comfort for a very long time."

Barnett tried to communicate with Dévé and writes:—

"Protocols, photographs and liberal portions of the pathological material hermetically packed were promptly posted to him at Rouen. But Rouen, alas, shortly afterwards, came under the savage fury of German bombardment and no doubt Dévé and his laboratory must have suffered more or less in this ruthless onslaught. Months have passed and I am

sorry to say that I have had not one word from my old friend and regular correspondent, and my last communications have been returned to me marked 'undelivered'."

Clayton Lane.

UTZ (Friedrich). Beitrag zur Diagnose des infiltrierend wachsenden Echinokokkus, unter besonderer Berücksichtigung des Zusammenhangs mit Unfall. [**The Diagnosis of Infiltrating Hydatid, especially in Relation to Accidents.**]—*Med. Klin.* 1940. July 12. Vol. 36. No. 28 (1855). pp. 777–779.

SAPERO (James J.). **The Hookworm Problem. Some General and Military Aspects. A Report of the Examination of 1,169 Naval Recruits.**—*U.S. Nav. Med. Bull.* 1940. Jan. Vol. 38. No. 1. pp. 136–143. [13 refs.]

It appears to be a common view that hookworm infection in a man in apparently perfect health is of no serious consequence, and that the hookworm problem is no longer of main importance in the south eastern United States. Naval data show that the contrary conditions hold.

Between 1918 and 1925 the incidence of Necator infection in 15,929 southern naval recruits was 23 per cent. After the hookworm campaigns instituted by the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease and the International Health Commission of that Foundation, the incidence fell from 19·87 in 1925 to 0·72 in 1932. So in that year routine faecal examination of naval recruits was discontinued, particularly as the International Health Board of the Foundation had intimated that hookworm disease had almost disappeared from the United States. Yet STILES at that very time had emphasized that hookworm infection was still widespread in the south.

Simple faecal smears were examined from 257 Norfolk recruits; the method was chosen because the previous naval hookworm studies had been made by it; it gave an incidence of 11·3 per cent., raised to 21·0 per cent. when 696 recruits were examined by the Willis gravity floatation method. But when only the "deep south" States were tested the lowest percentage of infection was 9·8 in Tennessee and the remaining States varied from 20 to 42 per cent. When by this technique infected were distinguished from non-infected the average haemoglobin in the former was 76·04 per cent. and in the latter 82·79, and a proportion of infected men, felt to be surprising, showed well defined anaemia; accordingly few supposedly healthy persons escape some harm. The presence of minor hookworm disease in the necessarily selected naval group postulates a serious condition in the south generally. In noting the presence of infection in men with up to 16 years service it is pointed out that infection in service may reasonably be ruled out. [But in transferring the observation to a conclusion that hookworms may live for that time it would be well for readers of this *Bulletin* to remember that when men have gone home on leave they will usually have gone back to the place where their original infection was acquired.] Once more coloured men were less infected than white.

Clayton Lane.

Broc (R.) & Calo (A.). Étude sur les répercussions cardio-vasculaires de l'ankylostomiase et d'autres helminthiases. [**The Effects of Ankylostomiasis and Other Helminthiases on the Cardio-Vascular System.**]—*Arch. Inst. Pasteur de Tunis.* 1941. June. Vol. 30. No. 1–2. pp. 77–102. With 16 figs. [50 refs.]

From Tunis these authors report, in ankylostomiasis and in certain other worm infections, the following chronic cardio-aortic conditions. Clinically there are dyspnoea, palpitations and cardiac murmurs and signs of cardiac insufficiency, while radiographs show dilatation of the left ventricle, and fairly often of all the heart cavities and of the aorta. This syndrome is no complication, but is caused by the anaemia and by helminthic toxins, and is influenced favourably by restoring the blood and removing the parasites. *Clayton Lane.*

i. Pessoa (S. B.) & Pascale (Humberto). Pesquisas sobre a ancilostomose em São Paulo. Sobre o método de Stoll-Hausheer para a contagem de ovos nas fezes. [**Investigations on Hookworm Infection in São Paulo. The Stoll-Hausheer Method for counting Eggs in Faeces.**]—*Arquivos de Hig. e Saude Pública.* 1941. Jan. Vol. 6. No. 11. pp. 13–22. English summary. [11 refs.]

ii. —— & ——. Tratamento da ancilostomose pelo tetracloretileno. [**Treatment of Hookworm Infection by Tetrachlorethylene.**]—*Ibid.* pp. 23–29. [16 refs.] English summary (7 lines).

iii. —— & ——. Observações sobre o tratamento da ancilostomose pelo tetracloretileno, baseadas em contagens de ovos, antes e depois da administração do remédio. [**Observations on the Treatment of Hookworm Infection by Tetrachlorethylene based on Egg Counts before and after Treatment.**]—*Ibid.* pp. 61–65. English summary.

iv. —— & ——. Sobre a eliminação de *Necator americanus* e de *Ascaris lumbricoides* após tratamento antihelmintico. [**Removal of *N. americanus* and *A. lumbricoides* after Anthelmintic Treatment.**]—*Ibid.* pp. 72–76. English summary (7 lines).

v. ——& Lucena (Durval). Sobre a disseminação de helmintoses nos habitantes de uma localidade saneada. [**The Distribution of Helminthiases in a Sanitated Locality.**]—*Ibid.* pp. 79–97. [11 refs.] English summary.

vi. —— & Pascale (Humberto). Intensidade da ancilostomose nos escolares de vários municípios. [**Intensity of Hookworm Infection in Scholars of Various Municipalities.**]—*Ibid.* pp. 66–71. English summary.

i. *The Stoll-Hausheer method for counting eggs in faeces.*—The Stoll-Hausheer counting method (which uses 1/200 gramme of faeces diluted in decinormal caustic soda solution) was compared with counts from simple smears (whose size seems nowhere stated) and with worm recoveries after treatment with carbon tetrachloride, tetrachlorethylene or oil of chenopodium (the individual drug used not being specified).

In a series of 31 persons the following means are reported: eggs to the gramme before treatment 1,690 (200 to 9,200), all Necators collected after treatment 93·3 (1 to 517), female Necators so collected 46·2 (1 to 242), number of eggs in the gramme for each female worm 36·5 and

for each Necator 18·1. As usual these mean numbers varied with the worm load; in a series of 19 from whom the female worms recovered averaged 9·8 the eggs numbered 52·5 per female per gramme, in a series of 12 with a mean worm load of 104 the mean number of eggs per worm per gramme was 13·9. Another error in calculating worm loads from egg counts was illustrated by treating persons who were negative to microscopic examination: 7 persons negative to a smear when examined by DARLING and SMILLIE in 1921, and subsequently treated, expelled a mean of 4·3 worms; when the authors so treated 8 persons negative to the Stoll-Hausheer method, their average collection was 5·9.

They note, once more, that this method misses light infections; they note, too that they have not used D.C.F. or D.C.F.F. [which would detect them.]

ii. *Treatment of hookworm infection by tetrachlorethylene.*—Using the evaluating test of SCHÜFFNER and VERVOORT on five series of patients, the authors have found tetrachlorethylene effective though intoxicant.

That is to say two treatments were given; the first was by tetrachlorethylene, oil of chenopodium being added if the Willis gravity floatation diagnostic technique showed Ascaris eggs to be present as well as those of hookworms; the second treatment was by carbon tetrachloride in dosage of 4 cc. for adults and 2 to 3 cc. for children; the stools were collected for 48 hours after treatment and 10 to 15 days later were again examined as before for eggs. Of the 60 persons so treated, 51 were found to have become unwormed so far as could be judged by this test. They fall into five groups, in four of which the after purge was a saline. (1) A group of 21 adults who got 3 cc. of tetrachlorethylene, with expulsion of 88·2 per cent. of the total hookworm collection. (2) A group of eight adults, dose 4 cc. expelling 95·8 per cent. (3) A group of eight adults, dosage 2 cc. tetrachlorethylene and 0·75 cc. oil of chenopodium, expulsion rate 91·8 per cent. (4) A group of nine children, dosage tetrachlorethylene 1·5 cc. and oil of chenopodium 0·25 cc. given in castor oil, expulsion rate 17·0 per cent. (5) A group of five children taking the same dosage as group 4, but followed by a saline purge, expulsion rate 70·2 per cent. Half or rather more of the treated became dizzy or drunken.

iii. *Observations on the treatment of hookworm infection by tetrachlorethylene based on egg counts before and after treatment.*—About 200 persons between 11 and 50 years old were treated with tetrachlorethylene or with carbon tetrachloride, the doses in either case being 0·1 cc. for each year of age below 20, while for adults it was 3 cc. The results were estimated by faecal egg reductions as revealed by the Stoll-Hausheer method.

When after either of these drugs an aperient of magnesium sulphate was given, the number of Necator eggs was reduced by about 80 per cent. after one treatment with carbon tetrachloride or after two by tetrachlorethylene; when one treatment of the latter was given the reduction of eggs was to about 50 per cent. To 50 children aged under 10 oil of chenopodium was added to these drugs in a dosage of half a drop for each year, the Necator egg count was reduced by about 70 per cent. When to 48 children under ten the mixture of tetrachlorethylene and oil of chenopodium was given in castor oil the Necator egg count was reduced by a mere 8 per cent.; when to 26 children also under ten this same tetrachlorethylene-chenopodium mixture was given, but presumably in saline, the egg numbers dropped by 56 per cent. When

13 adults received 2 cc. of tetrachlorethylene and 20 drops of oil of chenopodium the Ascaris egg counts dropped by 86 per cent., whereas when 17 others had 2 cc. of tetrachlorethylene alone, their Ascaris egg counts rose by 9 per cent. [such is the authors' calculation of a rise from 43,800 to 58,000 eggs to the gramme of faeces.]

iv. *Removal of N. americanus and A. lumbricoides after anthelmintic treatment.*—The anthelmintic treatment consisted of carbon tetrachloride and oil of chenopodium followed an hour later by a saline purge, and counts were made of the worms that were collected after one, two or more stools compared with the total collection after this one treatment. [Presumably the fact of infection was first established.] Tables show separately the sexes of hookworms recovered but not those of Ascaris and no case seems to be included in more than one table. As to Necators, washings of the first after-treatment stools of five persons gave 34 worms compared with a total collection of 510, two of them who passed no worms in their first stool gave total collections of 326 and 18; washings of the first two after-treatment stools of six persons gave 690 of the total collection of 1,092. Comparisons are made of the worm recoveries on day one and on day two from heavily and from lightly infected persons; 20 heavily infected persons passed 6,150 Necators on day one and 3,143 on day two; 20 lightly infected persons passed 32 Necators on day one and 263 on day two. From ten Ascaris infections were got 44 worms on day one and 43 on day two, but four other anomalous cases are listed who together passed three worms on day one, four on day two, none on day three and 23 on day four.

v. *The distribution of helminthiases in a sanitated locality.*—These examinations determine the extent of detected infections in inhabitants of a "sanitated" town close to São Paulo and in the soil round their houses.

Of 1,271 persons examined by the Stoll-Hausheer technique 61·4 per cent. harboured Necator, 68·2 Ascaris, 49·5 Trichuris and 12·1 other parasites; girls were more heavily infected than boys, particularly with hookworms; when the privies were inside houses the families were less heavily infected than when they were outside, the relative figures being Necator 39·3 and 59·3, Ascaris 74·4 and 83·5, Trichuris 75·1 and 79·6.

Round six schools the soil was examined, by the Baermann method for Necator larvae and by the Caldwells' method for worm eggs. That round five of the schools was negative for hookworm larvae, some being present about the sixth; round all of them the soil contained Trichuris eggs, sometimes in great numbers and some being embryonated; round all of them Ascaris eggs were present but their numbers were smaller.

Similarly, 15 households and the house surroundings were examined, the results being given in detail. Of the 37 children there examined infections by any worm were detected in 34 (Necator 16, Ascaris 32, Trichuris 27). Of six samples of earth taken from near privies, six contained Ascaris eggs, three Trichuris eggs, one Enterobius eggs and one is held to have shown Necator eggs. Dust from sweepings of 13 houses showed Ascaris eggs in 12, Trichuris eggs in five, Enterobius eggs in three. It is advised that the school should be a centre of instruction as to means for preventing the spread of these parasites.

vi. *Intensity of hookworm infections in scholars of various municipalities.*—Of 1,177 schoolchildren examined by the Stoll-Hausheer technique 75 per cent. showed Necator eggs in the

faeces. There was no significant difference between the sexes. The more rural areas showed infections running up to nearly 99 per cent., the more suburban to about half that figure. Among children whose homes had latrines 70·1 per cent. were found positive, among those who had not, the infection figure was 85·2. It is felt that a new hookworm campaign is needed here and that it should essentially be in the hands of school teachers rather than in those of the sanitary staff. *Clayton Lane.*

PESSOA (S. B.) & PASCALE (Humberto). Intensidade da ancilostomose em algumas fazendas de café no município de Ribeirão Preto. [**The Weight of Hookworm Infection in Some Coffee Plantations in the District of Ribeirão Preto.**]—*Arquivos de Hig. e Saude Pública.* 1941. Jan. Vol. 6. No. 11. pp. 30–37. With 3 graphs. English summary.

PESSOA (S. B.) & PASCALE (Humberto). Analise da infestação pelo Necator em uma fazenda de café e cana no município de Sertãozinho. [**Analysis of Infection by Necator in Coffee and [Sugar] Cane Plantation in the Municipality of Sertãozinho.**]—*Arquivos de Hig. e Saude Pública.* 1941. Jan. Vol. 6. No. 11. pp. 38–60. With 4 graphs. English summary.

LIU (H. L.) & WONG (Y. R.). **The Passage of Numerous *Ascaris lumbricoides* from the Male Urethra. Report of a Case.**—*Chinese Med. Jl.* 1941. June. Vol. 59. No. 6. pp. 570–574. With 2 figs. on 1 plate.

" A 37-year old farmer was admitted to the hospital with the complaint that he had passed for twenty years, at intervals, large roundworms from the urethra. While in hospital, he passed during four weeks before final operation 21 *Ascaris lumbricoides* of both sexes from the urethra. On one occasion, a photograph was taken of a worm just as it was leaving the urethra. At the age of 17 the patient had suffered from symptoms which made it very likely that at that time he had had appendicitis, with formation of an abscess, which had later opened into the intestine. Stool examination showed eggs of *Ascaris* together with eggs of *Trichuris* and hookworm. Urine, obtained by means of a catheter, likewise contained *Ascaris* eggs and also *B. coli* and other bacteria. Cystoscopy revealed a small shadow at the upper posterior portion of the bladder wall. An exploratory laparotomy showed extensive adhesions of the intestinal loops among each other and to the bladder. A vermifuge was given, and several more worms were passed from the urethra but none came out in the feces. Cystotomy was performed and a portion of the posterior bladder wall containing a small sinus was cut out. During operation, it was impossible to pass even a thin catheter through the bottom of the sinus into the lumen of an adherent intestinal loop. One has to remember, however, that the lumen of a fistula may have been widened when urinary bladder was filled. The wounds caused by the operation healed without complication, no more worms were passed, and the patient left the hospital in good condition. It may be added that he showed always a perfectly balanced mind without symptoms of hysteria or a desire to make himself interesting. There is, therefore, no reason to doubt his statements concerning the passage of a large number of worms from the urethra over a period of many years. Since *Ascaris*, as is well known, cannot multiply in the same host, it is certain that the patient must have become frequently re-infected."

The man had a peculiar sensation when the worm was about to come out, so photographs of its exit could be made.

Clayton Lane.

IYENGAR (M. O. T.). **Occurrence of *Wuchereria bancrofti* Infection in a Rural Area.**—*Indian Jl. Med. Res.* 1941. July. Vol. 29. No. 3. pp. 677–679.

" *Wuchereria bancrofti* infection which was known to have an urban distribution in India was recently found to occur in a rural area in Birbhum district (Bengal). The filarial infection rate in two villages examined was 17 per cent. Cases of elephantiasis of the leg and scrotum were also observed to occur. These villages showed a high incidence of malaria indicating that the presence of malarial infection in the population was not antagonistic to the occurrence of filarial infection.

" The transmitter of malarial infection as well as of filarial infection in these villages was found to be *Anopheles philippinensis*. In one specimen of *A. philippinensis*, both malarial and filarial infections were observed ; the salivary glands showed a heavy infection with sporozoites, while within the labium and thorax were many full-grown larvae of *W. bancrofti*."

" This would indicate that the same mosquito could transmit both malarial and filarial infections at the same time."

MENON (T. Bhaskara) & RAMAMURTI (B.). **The Behaviour of the Infective Larvae of *Wuchereria bancrofti* with Special Reference to their Mode of Escape and Penetration of Skin.**—*Indian Jl. Med. Res.* 1941. Apr. Vol. 29. No. 2. pp. 393–401. With 3 figs. on 1 plate.

The experiments were carried out on laboratory bred *Culex fatigans* released inside mosquito nets, for the method of inserting the hand into a small net scared this timid mosquito, nor was the use of a net-covered beaker successful in inducing the mosquito to feed.

" 1. Warm fluid at about 36°C. around the proboscis causes increased activity of the larvae in the proboscis and active attempts at escape."

But if the fluid were too warm the larvae retreated tail first from the proboscis into the mosquito's head or even body, as was observed when a stunned mosquito was watched under a microscope with powerful transmitted light.

" 2. Actual larval escape from the proboscis occurs only under conditions similar to those obtained during the act of biting, *i.e.* the labium, pushed up on the stylets, is bent in its proximal half and warm fluid at about 36°C. is sucked up through the stylets.

" 3. Viability of infective larvae is best in human blood and yolk of egg when kept in sealed chambers without exposure to air and free from sepsis. The maximum survival period obtained experimentally was more than a week, but no visible growth took place during this period.

" 4. Active infective larvae under experimental conditions do not penetrate unbroken skin, but migrate through the tissues only when deposited on the moist tissues in a breach in the skin and do not appear to have any taxis when deposited in the neighbourhood or over a breach of skin surface.

" 5. The experiments do not lend any support to the view that *W. bancrofti* can get into the human tissues from water through abrasions in the skin."

Clayton Lane.

LEHRFELD (Louis) & BREISACHER (Carl F.). **A Case of Trichinosis presenting Chemosis of the Bulbar Conjunctiva.**—*Jl. Amer. Med. Assoc.* 1940. Nov. 23. Vol. 115. No. 21. pp. 1794–1795. [12 refs.]

The authors feel that chemosis of the bulbar conjunctiva has not been sufficiently stressed as, and indeed is not generally considered to be, a symptom of trichinosis.

They describe a woman who came to hospital with chemosis so marked that the swelling protruded between the lids, while a blood count showed 10,800 white cells with 25 per cent. of eosinophils and the temperature ran as high as 105°F. A piece of excised gastrocnemius showed encysted larvae, but these John BOZICEVICH of the United States Public Health Service held to be third stage larvae the result of an earlier infection than that causing the present illness. Stated in more detail the eye symptoms were slight swelling of lids with none of forehead, the chemotic conjunctiva had a yellowish waxy appearance with slight injection of vessels, corneae were clear, irises, pupil reactions and fundi were normal. *Clayton Lane.*

BEAHM (Edgar H.) & JORGENSEN (Myron N.). **Some Effects of Experimental Trichinosis in the Dog.**—*Proc. Soc. Experim. Biol. & Med.* 1941. June. Vol. 47. No. 2. pp. 294–299. With 3 figs.

DEFICIENCY DISEASES.

EFREMOV (V. V.). **Experimental Avitaminoses of the B_2-Complex Group and Pellagra of Man.**—*Acta Med. URSS.* Moscow. 1939. Vol. 2. No. 4. pp. 622–630. [21 refs.]

This comprises an account of experiments on production of experimental avitaminosis of the B_2 complex group in animals and a comparison of these diseases with human pellagra.

In rats on a basal diet, with addition of yeast extract as a source of vitamin B_1 for 25 days, a cessation of growth took place, then dry egg albumen was added as a source of riboflavin and 50–60 days thereafter dermal changes appeared. The terms acrodynia or " florid dermatitis," which have been applied by GYÖRGY, CHICK and their associates to this condition, are unacceptable as not corresponding to the pathophysiological substratum of these disturbances.

The name erythroedema (erythema and oedema) is suggested as conveying a better appreciation of the process which begins with reddening and oedema of the dorsal aspect of the phalanges on one or both paws. When progressive, it results in gangrene. From histological studies it was ascertained that both clinically and histologically B_6 avitaminosis in white rats resembled pellagrous erythema of man. Experiments with sunlight irradiation showed that there is no provocative action of sunlight as regards appearance of erythroedema. B_6 avitaminosis of rats was perfectly cured by administration of autoclaved brewers' yeast as well as by an eluate from yeast extract.

The skin lesions accompanying ariboflavinosis in white rats consist of symmetrical and asymmetrical loss of hair, resulting in complete baldness of some skin regions and were most often observed around the " spectacle area " in the eyes. Some of the bald portions subsequently became eczematous through secondary causes. The term " alopecy " is proposed in this condition, and histological investigation showed great differences between B_1 avitaminosis and the skin lesions in ariboflavinosis.

Shortly before death, rats with avitaminosis B_6 and ariboflavinosis showed serious disturbances of the central nervous system, with atrophy of certain groups of muscles. Vitamin B_6 preparations did not affect these changes, but they were prevented by daily administration of 10–20 milligrammes of riboflavin.

In dogs deprived of the vitamin B_2 complex no changes were noted in the mouth or the mucosa of the tongue, but striking phenomena, consisting of disease of the pyramidal and of the Purkinje cells of the cerebellum and combined degeneration of the lateral pyramidal tracts and dorsal columns of the spinal cord, were noted. A special effort was made to produce the black tongue syndrome in dogs. In fact in adult dogs no close analogy with human pellagra was obtained, and in puppies also there was failure to do so, but in all the animals the disease was serious in that it proved fatal in 76–124 days. Histological examination again revealed the most marked changes in the nervous system as already described. In the peripheral nervous system the sensory changes in the tongue and nerve fibrils of the intestine were much more affected. It is suggested that lesions of the mouth and tongue described by GOLDBERGER and others presumably result from secondary infections.

In monkeys (*Macacus rhesus*) kept on a diet consisting mainly of cereals, millet, barley, white rice, sugar and carrot with a sufficient daily calorie value the conditions were, after a period of 6–8 months, mainly similar to the above.

Thus similar conditions were obtained in three classes of animals, widely separated from each other phylogenetically, by excluding vitamin B_6, riboflavin and nicotinic acid from their diet, but absolute identity of symptoms, or the sum total in each species, could hardly have been expected. It is suggested that in each case the pathological changes were associated with central nervous degeneration. These observations go a long way to refute the photodynamic theory of pellagra in its narrowest interpretation. Thus it has been noted that pellagrous erythroedema might develop in bedridden patients after surgical operations. At the same time it could not be established that there was any connexion between the intensity of the skin affections and the gravity of the disease. Grave cases of pellagra in man frequently develop in the absence of skin lesions.

In all cases there were disturbances of gastric secretion, usually anacidity, but frequently hyperacidity, refractoriness to histamine, so that patients with achlorhydria and other disturbances of the gastrointestinal tract would seem to be particularly liable to pellagra. The combined progressive degeneration of sensory and motor fibres in the central nervous system resembles that observed in experimental animals, and also the subacute combined degeneration associated with pernicious anaemia.

The author therefore considers it permissible to assume that, in spite of all endeavours, the complete reproduction of the pellagra syndrome in man will never be obtained by experimental work in lower animals.

P. Manson-Bahr.

SPRUE.

OLLEROS (Angel Rodriguez). Estudio gastrico en el sindrome "espru tropical" (gastroscopia, cromoscopia y bacteriología). [**Gastric Studies in Sprue.**]—*Publicaciones de la Universidad de Santo Domingo.* 1940. Vol. 9. 19 pp.

This communication contains a summary of bacteriological investigations of the gastric mucosa in sprue by gastroscopic methods. The author showed that in 92 per cent. of sprue cases the gastric mucosa was colonized by intestinal flora. It would appear that under tropical conditions the antibacterial defences which normally predominate in the intestinal tract are broken down and that this acts as a predisposing factor in the genesis of sprue. As is well known the normal gastric mucosal surface at *p*H 1·4–1·6 is sterile; the duodenum at *p*H 5·2–6·2 contains a few Gram-positive cocci; the upper jejunum at *p*H 6–7·0 Gram-positive cocci and a few Gram-positive and negative bacilli. The ileum at *p*H 6·8–8·0 contains a rich bacterial flora of the faecal type.

There is, therefore, a distinct relationship between the *p*H in different regions of the intestinal tract and the prevailing bacterial flora.

P. Manson-Bahr.

HAEMATOLOGY.

LEICHSENRING (Jane M.), DONELSON (Eva G.) & WALL (Lucille M.). **Studies of Blood of High School Girls.**—*Amer. Jl. Dis. Children.* 1941. Aug. Vol. 62. No. 2. pp. 262–272. [21 refs.]

[This paper, though not concerned with tropical conditions, is abstracted here because normal standards in temperate climates may be useful to tropical workers. The same applies to the paper by WIEHL, below.]

Haematological studies on 258 normal girls from 12 to 19 years old were made in Minnesota. The mean haemoglobin content was 12·21 ± 0·80 gm. (the standard error is used); red cell count, 4,150,000 ± 240,000; white cell count, 7,340 ± 1,770; proportion of reticulocytes, 1·08 ± 0·65 per cent.; and the diameter of the red cells, 7·90 ± 0·20 microns. The Hb was determined by the Newcomer method and the cell diameters determined by measuring one diameter of 100 cells in dried stained films by means of a filar micrometer.

The Hb values were lower for the 14 to 17-year-old groups than for the 12 to 13 or the 18-year-old groups. The average percentage of reticulocytes gradually decreased with age, and the mean red cell diameter showed a slight increase. The white cell counts were uninfluenced by age. Comparison of the data in girls past the menarche with those of the girls before the menarche in the same age group showed that menstruation had a lowering effect on haemoglobin levels in the 14 to 15-year-old group but not for those in the 12 to 13 group. It is suggested that Hb values and red cell counts in adolescent girls are more influenced by the rate of growth than by menstruation. The

mean age of the menarche was 12·9±1·1 years, and the mean length of the periods 4·6±1·2 days. [The mean age at which the menarche occurs depends on the method of grouping, and by adopting different systems differences of ±6 months are obtained. There is no indication here of the method employed.] *W. P. Kennedy.*

WIEHL (Dorothy G.). **Selecting Cases of Anemia among Adolescents.**—*Amer. Jl. Public Health.* 1941. Oct. Vol. 31. No. 10. pp. 1073–1078. With 2 figs.

During a survey of nutritional deficiences in high school groups in New York State, blood examinations were made on two sets of adolescents from 12 to 18 years old. The haemoglobin was determined with the photoelectric colorimeter by the Evelyn method. Erythrocyte counts and haematocrit readings were made. The first group of approximately 350 children, mostly Jewish, came from high income families, the second included over 2,000 individuals from a poor neighbourhood, and a large percentage of these were also Jewish. Boys showed a rapid increase of the Hb level at the ages 13 to 14 years, and this continued to the age of 17. In girls the highest Hb value was at age 12, though the number of cases at this age was too small to be statistically significant. The rapid change of Hb content during these years is associated with growth and the demand for iron, and this leads to the assumption that the Hb level may be more closely correlated with the stage of maturity than with the chronological age. Boys were therefore roughly classified into four categories according to the development of pubic hair and girls into four categories according to breast development. Mean Hb levels of boys in the same developmental class but of different ages were very similar, the more advanced sexual development the higher were the mean Hb levels. The blood changes appear to be closely associated with puberty, and they are of such a magnitude that it is necessary to take account of *development* in all cases of apparent anaemia selected on the basis of age standard. The change in girls was in the opposite direction. Those having moderate breast development had somewhat higher Hb values than girls in the adult class. When the two groups were compared it appeared that some of the girls in the low-income families had at least a mild anaemia, but few of the boys in the same group were deficient in Hb. *W. P. Kennedy.*

NAPIER (L. Everard), NEAL-EDWARDS (M. I.) & DAS GUPTA (C. R.). **Haematological Studies in Indians. Part XIII. Normal Indian Women in Calcutta.**—*Indian Jl. Med. Res.* 1941. Apr. Vol. 29. No. 2. pp. 375–391. With 1 graph.

Blood examinations done on 134 apparently normal Calcutta women included total red and white cell counts, haemoglobin estimations, reticulocyte count, corpuscular values, eosinophil, polynuclear and platelet counts, van den Berg reaction, red cell fragility, sedimentation rate and Wassermann tests. Statistical tables are given of 128 subjects as 6 were eliminated on account of anaemia. Between the ages of 15 and 38 there is little change in the blood picture save that the total leucocyte counts progressively decrease and the polynuclear index progressively increases. The Bengalee women show a significantly lower haemoglobin value than other Indian women

studied in this series of researches. The haemoglobin found here is also nearly 20 per cent. less than the comparable, previously determined figure for males in Calcutta. The sedimentation rate found was significantly higher than the usual text-book figure and indicates that a high rate in Calcutta should not *per se* be taken too seriously.

W. P. Kennedy.

RUSSELL (Beatrice A. S.). **Macrocytic Anaemia in Pregnant Women on the Gold Coast.**—*Lancet.* 1941. Dec. 27. pp. 792–795. [11 refs.]

One hundred severe cases of macrocytic anaemia in pregnancy, which condition is not uncommon on the Gold Coast, were analysed. Thirty-eight of the cases were under the author's care and in these the onset was rapid, and the duration of symptoms seldom more than a fortnight. The disease often started before the last quarter of the year. In addition to the common symptoms of acute anaemia, swelling of the feet, cough, fever, dysentery and oliguria occurred. As is common on the Gold Coast the condition was usually complicated by helminthic infection, and the positive-Wassermann rate was the same as that of the general population, which is about 32 per cent. Without treatment the condition progresses rapidly, and may end fatally in a few days or may be cut short by the onset of premature labour.

Treatment was by rest, full diet, and liver by mouth or by injection. Blood transfusion and induction of labour were seldom required. The response was good and the fatality rate in the series only 5 per cent. In both treated and untreated cases there is a tendency to premature labour with stillbirth, or death of the infant in the first week. The author considers that macrocytic anaemia is not a disease of pregnancy but a disease associated with pregnancy, and amongst the predisposing factors are poor diet, malaria and hypochromic anaemias.

W. P. Kennedy.

CLARKE (John H. C.). **A Case of Tropical Megalocytic Anaemia.**—*East African Med. Jl.* 1941. Aug. Vol. 18. No. 5. pp. 154–155.

A native woman was admitted to hospital in Northern Rhodesia semi-comatose and intensely anaemic after giving birth to a premature child 10 days before; there had been no post partum haemorrhage. The red cell count was only 750,000 and the colour index 1·5; no malaria parasites or spirochaetes were found in the blood, but normoblasts, megalocytes, punctate basophilia and polychromasia were present. The spleen was enlarged, there was pyuria, the patient lay with a fetid brown discharge oozing from the mouth, there was no oedema. Four injections of anahaemin were given and in five weeks the red cells had increased to 3,075,000, but megalocytosis remained; the spleen was smaller but still just palpable.

The patient had been discharged from the hospital, to which she had been admitted for cystitis and slight anaemia, 12 days before being readmitted in this state of collapse, and the case is interesting because of the suddenness of the onset of the intense anaemia. The author has not found any other reference to this condition in the area. *C. W.*

TROWELL (H. C.). **Liver Extract in Treatment of Tropical Macrocytic Anaemia.**—*Lancet.* 1941. Sept. 13. pp. 303–304.

Nutritional tropical anaemia does not respond to treatment as well as pernicious anaemia ; half-a-pound of whole liver daily is usually curative in the latter, but the former needs four times as much. Other workers' results with various liver extracts are discussed. The author chose two from the 12 cases in his care during 1940 as they showed no evidence of other complicating disease. Weekly doses of 5 to 10 cc. of liver extract (B.D.H.) produced satisfactory response. The author suggests that this extract may be more effective in this type of anaemia than the refined extracts which cure pernicious anaemia. It is also cheaper. *W. P. Kennedy.*

BASS (Murray H.). **Extreme Eosinophilia and Leukocytosis. An Unusual Clinical Syndrome of Unknown Origin occurring in Childhood.**—*Amer. Jl. Dis. Children.* 1941. July. Vol. 62. No. 1. pp. 68–79. With 1 coloured plate. [10 refs.]

The author has seen three cases of this condition, and this paper reports the outcome of the second case, first described in 1931, and of the third case which has been observed for 18 months.

The first case, in a girl of six years, lasted 2½ months, during which eosinophils varied between 39 and 70 per cent., and they were mostly mature. The child died of broncho-pneumonia and there was no autopsy. The second case was in a boy of eight years, admitted to hospital on account of vomiting with alternate diarrhoea and constipation. He had a generalized lymphadenopathy. There was a chronic cough with rhonchi, but the temperature was normal. Leucocytosis was persistent, the count ranging between 24,000 and 45,200, while the mature eosinophils varied between 33 and 73 per cent. X-ray showed miliary pulmonary infiltrations. After some three years the chest X-rays were normal and the eosinophilia gradually disappeared in the course of seven years. Nine years after onset the eosinophils were 1 per cent. and the total white cells 12,000. He was then in excellent health.

The third case was in a 6½-year-old negro boy with rickets. There was leucocytosis and 22 per cent. of eosinophils. The temperature ranged up to 102°, the spleen was palpable, as were numerous lymph nodes. There were no indications of the cause of the eosinophilia.

A full discussion of the pathology and symptomatology compared with the cases reported by others, leads to the conclusion that this syndrome fails to fit into the category of any previously described conditions. While the cause remains unknown, it appears probable that it is some type of chronic infection. [See also this *Bulletin*, 1939, Vol. 36, p. 421 ; 1941, Vol. 38, pp. 538, 539.] *W. P. Kennedy.*

DERMATOLOGY AND FUNGOUS DISEASES.

GOMEZ FARIAS (R.). **Investigation of the Presence of Spirochete causing Pinta in Five Hundred Cases.**—*Rev. Med. Milit.* 1939. Vol. 2. p. 32. [Summary taken from *Arch. Dermat. & Syph.* 1942. Jan. Vol. 45. No. 1. pp. 163–164. Signed CANIZARES.]

Gomez Farias reviews the history of different theories of causation of pinta. The mycotic theory advocated by Montoya Flores was the most popular one until recently. The disease was also attributed to avitaminosis. Gonzales Herrejon in 1927 first suggested the theory that the disease was caused by a spirochete. The high incidence of positive Wassermann reactions was a strong argument in its favor. Saenz, Alfonso and Grau in 1938 first discovered the causative spirochete. The author performed dark field examinations in 500 cases, and in 98 per cent. of them the organism was found.

MELENEY (Henry E.). **Pulmonary Histoplasmosis. Report of Two Cases.**—*Amer. Rev. Tuberculosis.* 1941. Aug. Vol. 44. No. 2. pp. 240–247. With 5 figs. [12 refs.]

In a review of histoplasmosis the author briefly mentioned certain unpublished cases [this *Bulletin*, 1941, Vol. 38, p. 355]. The present paper describes two of them in more detail. They were of interest because of the pulmonary features which before death had led to a diagnosis of malignant disease and tuberculosis. The correct diagnosis was not made till after death, when it was found that the lungs were involved in nodule formation with cavitation. In one case acid-fast bacilli were found in the lung lesions, while in the other they were discovered in the sputum during life. It would seem that in both cases sections of the lesions revealed endothelial cells packed with the causative organism. Attention is called to these cases in men 69 and 50 years of age, and it seems probable that histoplasmosis may be more common than has been suspected and that familiarity with the disease will lead to its diagnosis in many cases before death. *C. M. Wenyon.*

MISCELLANEOUS.

OTTEN (L.). **The Government Lymph Establishment and the Pasteur Institute 1891–1940.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1941. Vol. 30. No. 3/4. pp. 214–230. [10 refs.]

ROE (M. A.), WILCOX (A.) & LILLIE (R. D.). **Eosinates of the Azures and Methylene Blue in Preparation of a Satisfactory Giemsa Stain from Dyes of American Manufacture.**—*Public Health Rep.* 1941. Sept. 26. Vol. 56. No. 39. pp. 1906–1909.

There is a wide variation in the dye content of different lots of azure B available in the United States. The authors have found that the eosinates of azure A, azure B and methylene blue are easily prepared and of constant composition, so that by using them, variations in composition of stains may be avoided.

"Eosinates of the basic dyes were prepared by dissolving 2 grams of each in 200 cc. of distilled water. A 10 per cent. solution of eosin Y (certified by the Commission of Standardization of Biological Stains) was added, 15 cc. at first and then in 1 cc. quantities until the resulting solution in thin layers was pale blue without any pink between the particles. The eosinate precipitate was filtered out on hard filter paper in a Buchner funnel with vacuum, and then dried."

The amended formula for Giemsa stain is :—

Azure A eosinate	50 mgm.	
Azure B eosinate	250 ,,	
Methylene blue eosinate	200 ,,	
Methylene blue chloride (88 per cent.) ...	100 ,,	(50–75 mgm. may be enough)
Glycerin	50 cc.	
Methyl alcohol	50 cc.	

This stain, after standing a few days, is diluted 1 in 50 with distilled water buffered to *p*H 7·0. Staining takes place for 45 minutes and the results with malaria parasites and trypanosomes are very satisfactory. [See also this *Bulletin*, 1940, Vol. 37, p. 876.] *C. W.*

LOUW (J. H.). **"Desert Sores."**—*South African Med. Jl.* 1942. Jan. 24. Vol. 16. No. 2. pp. 43–44.

The sores described in a military unit do not include those caused by *C. diphtheriae*, or tropical ulcer, oriental sore, malignant pustule or sporotrichosis, which were not seen by the author [but readers may recall that the name desert sore, of the war of 1914–1918, was associated closely with diphtheritic lesions of the skin. See this *Bulletin*, 1920, Vol. 16, pp. 153, 215.]

The sores described were largely septic cuts or abrasions, furunculosis, or the sores which start as painful blisters. It was remarked that men who disregarded personal hygiene and cleanliness repeatedly suffered, and that neglect of timely first aid was an important factor. The incidence of sepsis in transport drivers, who usually have oil or grease on their limbs, was notably less than in the remainder, and it is thought that dryness of the skin is a predisposing factor. The diet of the troops was good.

First aid consisted of prompt application of tr. benzoin co. or tr. iodi, with occlusion by elastoplast (especially for insect bites), or cleansing of larger wounds with saline and application of acriflavine ointment, or powdered sulphonamide, and closure with elastoplast. Treatment of developed sores with acriflavine ointment or sulphonamide and elastoplast was highly successful, ung. zinci was useful as a covering for the sulphonamide. Elastoplast dressings were usually left undisturbed for several days, and the part immobilized as far as possible. Boils were treated with fomentations, carbuncles with sulphonamides locally.

Acriflavine ointment consists of acriflavine 0·1 per cent., adeps lanae (anhydrous) 45 per cent., water to 100 per cent. To this may be added 10 per cent. sod. sulph. for the osmotic effect. If this cannot be made, a mixture of equal parts of emulsio acriflavine, 1 in 1,000, and ung. zinci or anhydrous lanoline, is a good substitute. These treatments are most effective. It is pointed out that although these sores do occur, the men are healthier than they have been for years. *C. W.*

HOYNE (Archibald L.) & LARIMORE (Granville W.). **Sulfathiazole as a Cause of Death. Report of Patient with Acute Agranulocytosis.**—*Jl. Amer. Med. Assoc.* 1941. Oct. 18. Vol. 117. No. 16. pp. 1353–1354.

The patient, a man of 34 in apparently good health, gave a history of exposure to venereal infection, and his physician prescribed a course of sulphathiazole of not more than 40 tablets each of 0·5 gm., to be taken at the rate of eight tablets a day. The patient, however, obtained further supplies and continued to take from two to eight tablets a day until about 200 tablets had been consumed. Two months after his first visit to the physician he was admitted to hospital with a diagnosis of laryngeal diphtheria, and died within a few hours. Autopsy revealed the condition as acute agranulocytosis with severe membranous and gangrenous pharyngitis and laryngitis.

Although death from agranulocytosis attributable to sulphathiazole has previously been reported in a very sick person, this is apparently the first case in which a man in good health has succumbed to this condition arising from prolonged medication with the drug.

C. W.

WILDISH (G. H.). **Larva Migrans.** [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1941. Sept. 9. Vol. 35. No. 2. p. 129.

The author gives the following directions for treatment :—

" Add 1½ drachms iodoform to 2 oz. ether and cork in a suitable bottle Take a piece of lint of a size to freely cover the area affected, cut oiled silk ½ inch or so larger than the lint, damp the lint with water (damp it only, do not wet it). Pour the iodoform solution on the skin, pour some on the one side of the lint, apply covering with the oiled silk and bandage. Change three times a day."

The condition is usually cured in 48 hours ; secondary infections may be treated in the ordinary way, the author uses a wet dressing of 1 volume of methylated spirit to 4 volumes of 1 in 4,000 hyd. perchlor. solution.

C. W.

CHIN (Ta-Hsiung). **Note on Leech Infection in Man.**—*Chinese Med. Jl.* 1941. Sept. Vol. 60. No. 3. pp. 241–243.

Four cases are reported, probably the first to be recorded in China ; three from Lotien, one from Chaotung. In each case the leech was found in the nostril and had probably entered during the act of drinking. The parasites measured from 20 to 57 mm. in length, and corresponded morphologically with members of the genus Haemopis (Savigny 1820). The habits of this genus are similar to those of Limnatis, the adults living at the bottom of pools, the young near the surface, whence they can readily be swallowed by animals. Horse leeches are common in these areas, and are chiefly acquired during the dry season.

C. W.

EARLE (K. Vigors). **Echinoderm Injuries in Nauru.**—*Med. Jl. Australia.* 1941. Sept. 6. 28th Year. Vol. 2. No. 10. pp. 265–266. With 1 fig.

The *enor* of Nauru, or sea-urchin, *Centrechinus setosus*, has a body of 3½–4 inches and spines ranging from 1–3 inches in length, each with a

considerable range of movement and rotating towards any spine which is touched. Each is barbed, the barbs directed towards the free end. The ends of a fractured spine exude a red fluid, like Condy's fluid. Unlike the spines of the West Indian sea-urchin (*Centrechinus antillarum*) the spines are not phagocyted after penetrating the human body, but remain and may set up inflammatory mischief some long time later, three months in a case recorded by the author. The spines are not themselves poisonous ; injury is purely mechanical or due to secondary infection. Removal should be attempted, but is not easy as the spines are very brittle. *H. H. S.*

MEDICAL JOURNAL OF AUSTRALIA. 1941. Aug. 16. 28th Year. Vol. 2. No. 7. p. 177.—**Persimmon Ball in the Stomach.**

Persimmons are a popular fruit in some countries, but are rarely eaten before they are ripe on account of their astringent characters when unripe. This astringency is due to shibuol. Children, however, may eat the unripe fruit with disastrous results due to the shibuol coagulating on coming into contact with the HCl of the gastric juice and gumming together into a fairly firm mass pieces of fruit, pulp or skin, or other starchy food. In this way a "persimmon ball" may form and give rise to symptoms varying in degree from gastric discomfort and dyspepsia to nausea, vomiting and acute distress, and, passing through the pylorus, to duodenal or intestinal obstruction, for it may measure some three inches in diameter. Their presence may cause ulceration. These "balls" are not pliable nor friable, and attempts to force them on by giving purgatives are fraught with danger, for obstruction is facilitated. The only effectual treatment is removal by operation, the ulcer, if present, being dealt with at the same time.
H. H. S.

DAVIES (J. N. P.) & HEWER (T. F.). **Ainhum : Report of a Case in England with Histological Study.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1941. Sept. 9. Vol. 35. No. 2. pp. 125–128. With 5 figs.

A negro, 55 years of age, a ship's stoker, was admitted to the Bristol Royal Hospital. He had worn shoes for the past 36 years. Seven years ago he noticed a cleft in the skin on the inner and plantar aspects of the left little toe. During the next six years this cleft deepened and became inflamed, and recently the right little toe began to show a cleft. X-rays revealed calcification of the tibial and dorsalis pedis and interosseous arteries. The shaft of the proximal phalanx of the left toe showed thinning, from absorption of the cortex, and the head of the bone was mostly absorbed. Serum tests for syphilis were negative.

Amputation was carried out ; post-operative healing was slow. The pathological histology of the removed digit is described. The general condition was that given in the text-books, but the details of the changes at the site of constriction are not stated in text-books and are thus described by the authors :—

"A section through the *site of constriction*, towards the head of the proximal phalanx, shows the same keratinization and a cleft passing right through the epithelium of the plantar aspect. This cleft is lined by granulation tissue and reaches to within a quarter of a millimeter of the periosteum. The granulation tissue has evidently been present for a long

time and contains numerous foreign body giant cells. There is a chronic periostitis surrounding the phalanx, the reaction being similar to that in the skin wound: many foreign body giant cells are present. There is no necrotic material other than that in the skin cleft and bacterial stains show no organisms. In this section the subcutaneous collagen is very dense and acellular: it encloses nerves and blood vessels and is firmly attached to the periosteum. The bone here measures 4 mm. in diameter and is rarefied, there being no complete layer of compact bone beneath the periosteum."

There is no suggestion that the arteriosclerosis and calcification played a part in the ainhum condition, though they may be held responsible for the slow healing after operation. It is suggested—but no evidence is adduced—that some fungus, an epidermophyton, may be the initial cause of the disease, a chronic epidermophytosis producing excess of cicatricial tissue and resultant constriction. *H. H. S.*

TESKE (Jacob M.). **Ainhum. Report of a Case.**—*Arch. Dermat. & Syph.* 1941. Dec. Vol. 44. No. 6. pp. 1108–1109. With 1 fig.

A negro of 49 in Alabama showed typical ainhum and gave a history of one year. The cicatricial ring completely surrounded the little toe of one foot. The Wassermann was negative and there was no evidence of tinea or other skin infection, but on the inner part of the digito-plantar fold there was some skin ulceration. Amputation was performed. *C. W.*

BERMAN (Charles). **The Etiology of Primary Carcinoma of the Liver—with Special Reference to the Bantu Races of South Africa.**—*South African Jl. Med. Sci.* 1941. Nov. Vol. 6. No. 4. pp. 145–156. [123 refs.]

"Information relative to the etiology of primary liver cancer ascertained during an enquiry into the incidence and nature of the disease amongst the Bantu of the Witwatersrand is presented and discussed.

"Primary carcinoma of the liver is a disease in which racial factors appear to play a prominent part. It is very rare amongst all white-skinned races irrespective of geographical distribution, whereas it is common amongst most pigmented races, particularly the Bantu, the Javanese and the Japanese. In the Bantu it is preeminently an affection of young adult males.

"The view that cirrhosis of the liver is an intermediate stage in the evolution of cancer is substantiated. Multilobular cirrhosis was an accompaniment in every Bantu case studied, and in 73 per cent. of cases recorded in the literature.

"The chief toxic agents apparently concerned in the production of cirrhosis are indicated. In the Bantu these include helminthiasis, malaria, schistosomiasis, haemochromatosis and alcohol. Amongst other races additional factors considered are infestation with Taenia echinococcus, Opisthorchis felineus and Clonorchis sinensis.

"The literature concerning recent advances in the experimental production of primary liver cancer is reviewed." [See also this *Bulletin*, 1941, Vol. 38, p. 540.]

[Other references to primary carcinoma of the liver in tropical countries may be found in this *Bulletin*, 1932, Vol. 29, p. 532 ; 1933, Vol. 30, p. 259 ; 1935, Vol. 32, p. 522 ; 1936, Vol. 33, p. 558.]

SCHNEIDER (O.). Bemerkenswerte Erscheinungsformen von Geschwülsten im tropischen und subtropischen Asien (Beteltumoren) und ein spekulativer Erklärungsversuch der Geschwulstentstehung ueberhaupt. [**Betel Tumours and Speculations on the Origin of Tumours.**]—*Schweiz. Med. Woch.* 1941. Dec. 13. Vol. 71. No. 50. pp. 1552–1554.

The tumours which arise in chewers of betel and some other tumours commonly met with in the tropics afford the author a great opportunity to present his views on the origin of tumours in general. It is interesting to note that betel chewing and opium smoking are rather sharply delimited the one from the other in the populations practising these customs. The betel compost is a mixed one, consisting of areca nut, betel leaf wrapping and lime with a little addition of cigarette tobacco. A profuse salivary secretion results from its presence in the mouth, which, however, is not swallowed but ejected. It is not quite certain which of the constituents, on the basis of " chronic irritation," is to be incriminated as carcinogenic. Females as well as males, young as well as old, are given to betel chewing and malignant epithelial growths in the mouth due to this cause have consequently a decidedly different age and sex distribution from that commonly accepted. The great majority of the tumours are squamous cell carcinomas, although rodent ulcers are also described. These may be situated in the lower lip, tongue and palate. Sarcomas have been traced to the periosteum of the jaws and to the antrum, while a few tumours such as fibromas are benign in character.

From the subject of tumours in betel chewers—not betel tumour as it has erroneously been called—the author passes for a great part of the article to well informed speculation on the origin of tumours. He comments on certain peculiarities of tumours as met with in tropical and subtropical lands, which are peculiarities of geographical and racial distribution.

As regards carcinogenesis the author's view seems to be that malignant trauma is one primarily to the nucleus of the cell. The nucleus is dispersed into the cytoplasm in the form of seeded particulate matter and is still capable of reconstituting itself by molecular fusion in living form as the generally accepted unit, the cell. Thus he does not restrict himself to accepting the fully constituted cell as alone manifesting vital energy. His theory therefore passes, for the origin of life, to simpler units of molecular dimensions. He elaborates this speculation likewise into his tumour theory by way of such conceptions as polymerization or depolymerization of the protein molecule. For these views he produces illustrations such as those of the homologous and heterologous tumours, the mixed tumours such as fibro-chondro-myxo-osteo-sarcoma and malignant tumours, all as instances of intra-cytoplasmic seeding and molecular commingling.

In conclusion he says : " Of course the whole is a pure speculation so far as concerns the actual process of tumour development." No direct reference appears to be made to the concept of gene mutation.

W. F. Harvey.

MREYEN (F. W.). Over djengkolintoxicatie. [**Djenkol Poisoning.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1941. Oct. 7. Vol. 81. No. 40. pp. 2139–2146.

The author describes the results of experiments with Djenkol, in which he gave fresh raw beans, cooked beans, and beans (raw or cooked) which had been kept for 6 weeks, to a rabbit, several guineapigs and a monkey. The beans were given alone, or with salt, or molasses, or coconut oil, or shrimps (garnalen), with hydrochloric acid, or with sodium bicarbonate. He also notes two fatal human cases. At post mortem the main brunt seemed to have fallen on the kidneys which were very hyperaemic; the jejunum and liver showed slight congestion; otherwise the findings were negligible and in the words of the author, "the point of attack, from the view of pathological anatomy remains still obscure." [See this *Bulletin*, 1936, Vol. 33, p. 724.] *H. H. S.*

SEATON (D. R.) & LUMSDEN (W. H. R.). **Observations on the Effects of Age, Fertilization and Light on Biting by *Aëdes aegypti* (L.) in a Controlled Microclimate.**—*Ann. Trop. Med. & Parasit.* 1941. Oct. 21. Vol. 35. No. 1. pp. 23–36. With 3 figs. & 1 graph. [19 refs.]

The authors devised an apparatus in which batches of 10 female *Aëdes aegypti* were given the opportunity of feeding on man while exposed to controlled conditions of atmospheric temperature and humidity (24·5–25·5°C. and 4·5–5·5 mm. Hg. saturation deficiency). The effects of starvation, fertilization and light on the numbers biting were then studied. When virgin females were starved from the time of emergence the numbers which fed increased up to 72–120 hours and then began to fall off, the mean length of life under these conditions being 4·8 days; all the mosquitoes being dead after seven days. When these virgin females were allowed access to males on successive nights the numbers fertilized were found to increase with age: 12 per cent. on the first night, 50 per cent. on the second, 82 per cent. on the third. But fertilization had no effect on the avidity for blood. Exposure to light reduced the numbers biting: at an illumination of 0·5 metre candles the numbers were reduced by almost half as compared with the mosquitoes in darkness. *V. B. Wigglesworth.*

HOSKINS (W. M.). **Recent Contributions of Insect Physiology to Insect Toxicology and Control.**—*Hilgardia.* Berkeley, California. 1940. Aug. Vol. 13. No. 6. pp. 307–386. [15 pages of refs.]

Poisons used to destroy insects enter by the mouth (stomach poisons), by the respiratory system (fumigants) or by the general or tracheal cuticle (contact poisons). Their action is thus determined on the one hand by their intrinsic toxicity for the different tissues, on the other by their ability to penetrate the cuticle, to enter the tracheal system or to be taken up with the food. The scientific study of insecticides has thus to take account of their mode of action on the living cells, of those physicochemical properties which enable them to spread over or penetrate the cuticle or pass along the tracheae, and of the feeding or breathing habits of the insects in question. In this review by

Hoskins will be found the most recent facts and hypotheses on all these matters. Insects of medical importance figure largely among the examples. There is a fairly full discussion on the mode of action of oils on mosquito larvae considered in relation to the general question of the entry of fluids into the tracheal system. *V. B. Wigglesworth.*

MENTZER (R. L.), DAIGH (F. C.) & CONNELL (W. A.). **Agents for increasing the Toxicity of Pyrethrum to Mosquito Larvae and Pupae.** —*Jl. Econom. Entom.* 1941. Vol. 34. No. 2. pp. 182–186. With 1 fig. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Mar. Vol. 30. Pt. 3. pp. 39–40.]

An account is given of experiments to determine whether the effectiveness against mosquito larvae and pupae of an emulsion of oil containing pyrethrum extract, prepared according to Ginsburg's formula with a light fuel oil substituted for kerosene, is increased by the addition of pine oil, ethylene glycol ether of pinene (D.H.S. Activator) or a terpene cyanoacyl compound, fenchyl thiocyanoacetate (Thanite). For preliminary tests, a long series of combinations was prepared by adding these activators in varying quantities to three oil emulsions, the first of which was the standard larvicide, while the others were similar except that one contained only half as much pyrethrum extract and the other none. Five combinations were finally selected for comparison with the standard. The oil in two contained the same amount of pyrethrum extract as the standard and either 5 per cent. D.H.S. Activator or 10 per cent. pine oil, while that in the other three contained only half as much pyrethrum extract and either 5 per cent. D.H.S. Activator, 15 per cent. pine oil or 2·5 per cent. Thanite. Laboratory tests, usually fourfold, with untreated controls, were made with larvae and pupae of *Culex pipiens*, L., *Aëdes vexans*, Mg., and *A. sollicitans*, Wlk. The technique is described. Counts were made 1, 4 and 24 hours after treatment. Field tests were also carried out with *A. sollicitans* in a salt marsh in Delaware, and counts made 24 hours after treatment. The percentage mortalities of each species effected after the various intervals had elapsed by each of the six larvicides diluted at 1 : 10 and 1 : 20 and applied at 50 U.S. gals. per acre are given in a table. In the laboratory tests, all larvicides diluted at 1 : 10 were more toxic than those diluted at 1 : 20, and *A. vexans* was more resistant than the other species. There was some indication that pupae were more susceptible than larvae to materials at 1 : 10, since higher mortalities after 1 and 4 hours were often recorded. The difference in toxicity between the larvicides appeared more pronounced in the case of the 1 : 20 than the 1 : 10 dilutions, especially after 4 and 24 hours. All experimental combinations were more toxic than the standard after 1, 4 and 24 hours when diluted at 1 : 10, and after 24 hours when diluted at 1 : 20. Both with regard to toxicity and cost, an emulsion in which the oil contains half as much pyrethrum extract as the standard and 5 per cent. D.H.S. Activator, used at the recommended dilution of 1 : 10, was the most satisfactory. In the field tests, each experimental combination at 1 : 10 killed a higher percentage of larvae than that (95) killed by the standard. The toxicity at 1 : 20 was usually equally satisfactory. No harmful effect on fish (*Fundulus* spp.) or salt marsh vegetation (*Spartina*) was noticed.

CHANDLER (Asa C.). **A Case of Urinary Myiasis.** [Research Notes.]—*Jl. Parasitology.* 1941. Oct. Vol. 27. No. 5. p. 465.

The patient, a woman of 32, in Texas, passed about 15 third stage larvae of *Lucilia sericata* in the urine, all on one occasion. Thereafter she complained of pain in the bladder, and the urine was found to contain red and white blood cells, albumen, and many motile bacilli. No information as to the source of the infection could be given.

C. W.

REES (C. W.), REARDON (Lucy V.) & JACOBS (Leon). **The Cultivation of the Parasitic Protozoa without Bacteria.**—*Amer. Jl. Trop. Med.* 1941. Sept. Vol. 21. No. 5. pp. 695–716. [96 refs.]

MILLS (Clarence A.). **The Influence of Climate and Geography on Health.**—*Bull. New York Acad. Med.* 1941. Dec. Vol. 17. No. 12. pp. 922–933. [Summary appears also in *Bulletin of Hygiene.*]

Man and certain other warm-blooded animals can utilize for work only 20 to 25 per cent. of the total combustion energy ; they are about as efficient as good petrol engines, but not nearly so efficient as Diesel engines, which convert 37 per cent. of energy into work. Although the body is highly adaptable to external temperature in so far as heat loss is concerned, yet when exposed continuously to high temperatures there is a tendency to reduce heat production, with consequent slower growth, retarded development, reduced fertility, lowered resistance to infection and lowered energy for thought or action. For instance, the stature of children born in the United States and later taken to the Panama Canal zone deteriorates more and more with each year of residence there. Human fertility is highest at mean monthly temperatures round 65°F. ; it is depressed at temperatures below 40° or above 70°. Menstruation commences later in tropical than in temperate climates ; the contrary view is commonly held but the author claims that it is not supported by statistics. The onset of fertility is delayed in hot countries ; in the tropics illegitimate first births come at practically the same maternal age as legitimate, in temperate lands illegitimate first births come at much earlier maternal ages.

Experiments on mice have shown that moist warmth reduces the ability to survive inoculation with pneumococci, and production of antibodies after bacterial vaccination is much more active at 65°F. than at 90°F. In man, indigent tuberculous patients born in or north of Cincinnati survive the disease about twice as long as those born near the Gulf of Mexico.

In general, it is the infectious diseases which kill off the people of the tropics, but in temperate climates death is due more to degeneration or metabolic breakdown. For instance, diabetes is more severe in cool countries, pernicious anaemia is rare in the tropics, admissions to hospital in Cincinnati for heart failure are four times as frequent in winter as in summer. Intelligence tests in students are answered on a lower level in summer than in winter.

A second climatic factor, that of cyclonic storminess, appears to be responsible for the initiation of many types of infectious disease, particularly of respiratory and rheumatic types. Death and sickness rates

rise in the colder and more stormy years. Ability to survive these diseases, however, depends largely upon mean temperature levels and ease of body heat loss.

The author shows that if cellular combustion is slowed by external warmth, the vitamin B requirement for each gramme of food is sharply increased, so that in animals at 90°F. the thiamin requirement is twice as great as at 65°F. Moreover, in the tropics it appears that the vitamin B content of foods is less than in temperate climates; human needs are therefore higher, but the available supply is lower. This probably constitutes one basis for the poor nutrition and low vitality prevalent in residents in the tropics.

Toxic effects of thiamin are described; they resemble the syndrome of hyperthyroidism—insomnia, nervousness, hyperirritability, emotional instability, rapid pulse, palpitation, nausea and vomiting. More severe symptoms of collapse, syncope, circulatory shock, and even death, have been ascribed to over dosage with thiamin, which is now commonly used, in large doses, as a medicament. It is possible that toxic reactions to thiamin occur more freely in people suffering from multiple vitamin B deficiencies. [The reader may refer to a previous paper by the author on climate and metabolic stress, see *Bull. of Hyg.* 1940, Vol. 15, p. 68.] *C. W.*

HARLEY (George Way). **Native African Medicine. With Special Reference to its Practice in the Mano Tribe of Liberia.**—pp. xvi+294. With 1 plate & 1 map. 1941. Cambridge, Mass: Harvard University Press. London: Humphrey Milford, Oxford University Press. [21*s.*]

DRECHSLER (Charles). **Predaceous Fungi.**—*Biol. Reviews.* 1941. Oct. Vol. 16. No. 4. pp. 265–290. [87 refs.]

REVIEWS AND NOTICES.

PUBLICATION OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE No. 15. **A Symposium on Human Malaria with Special Reference to North America and the Caribbean Region.** [Publication Committee: BOYD (Mark F.), Chairman, SOULE (Malcolm H.), Secretary, COGGESHALL (L. T.), CRAIG (Charles F.), TALIAFERRO (W. H.) & WILLIAMS (L. L.), Jr. Edited by MOULTON (Forest Ray)].—pp. viii+398. 1941. Washington, D.C.: Smithsonian Institution Building. [32*s.* 6*d.*]

The foreword to this valuable contribution to malaria literature states that this volume "presents a systematic, comprehensive, authoritative and thoroughly documented discussion of the problems of human malaria in North America and the Caribbean region." The claim is fully justified. Close students of malaria literature may find little that is new in this book; they will find, however, extremely well documented summaries of nearly all the important contributions

to our knowledge of human malaria that have been made during recent years by American malariologists, correlated and condensed into relatively small space. This is not to imply that the work of foreign malariologists has been ignored; all authenticated knowledge has been brought to bear on these discussions of malaria as it prevails in the North American Continent and the Caribbean Region.

The historical introduction to the symposium is supplied by BOYD. The seven subsequent sections of the book are devoted to Parasitology, Anopheline Vectors, Epidemiology, Symptomatology, Pathology and Immunity, Treatment, and Control and Eradication. A comprehensive bibliography occupying 28 closely printed double-column pages is a useful feature. Under Parasitology the distribution of malaria in North America, Mexico, Central America and the West Indies is described by FAUST; the taxonomy of the human malaria parasites with notes on the principal American strains is dealt with by COATNEY and YOUNG who are also responsible for the account of the morphology, life cycle and physiology of *P. malariae*. Similar descriptions of *P. vivax* and *P. falciparum* are provided by MANWELL and KITCHEN respectively. The detection and differential diagnosis of malarial parasites in the schizogonous and sporogonous cycles are clearly described by WILCOX and LOGAN.

The section "Anopheline Vectors" includes descriptions of the general morphology of Anopheles and of the classification, distribution, bionomics and ecology of the Nearctic species of Anopheles, all by KING and BRADLEY. The classification and identification of the Anopheles mosquitoes of Mexico, Central America and the West Indies are described by KOMP, and the distribution and ecology of Anopheles of the Caribbean region by ROZEBOOM. HUFF deals with factors influencing infection of Anopheles with malaria parasites, and SIMMONS with the transmission of malaria by the Anopheles mosquitoes of North America.

Under "Epidemiology" CRAIG discusses cyclical variation in malaria incidence, and WATSON and HEWITT the topographical and related factors in the epidemiology of malaria in the regions concerned. HACKETT contributes a chapter on malaria and the community, and MATHESON deals with the rôle of Anophelines in the epidemiology of malaria.

The symptomatology of malaria in general, in man, is the subject of an interesting chapter by BOYD. STRATMAN-THOMAS describes the symptomatology of *P. vivax* malaria, and KITCHEN that of *P. malariae* and of *P. falciparum* malaria. The last-named author also deals with blackwater fever.

Two chapters by CANNON and MELENEY, respectively, deal well with the pathology of human malaria. REDMOND, TALIAFERRO and COGGESHALL discuss different aspects of immunity in malaria.

The pharmacology of Cinchona and its alkaloids is described by NELSON; other medicinal agents used in treatment are dealt with by MOLITOR. MAIER contributes a chapter on experimental chemotherapy. CLARK and KOMP summarize their ten years' observations in Panama on the attempted control of malaria by drug administration.

The last section "Control and Eradication" comprises articles on general considerations in planning malaria control by ANDREWS; malaria surveys by ELMENDORF; measures against adult mosquitoes by JOBBINS; mosquito-proofing by KIKER; drainage and filling by RECTOR; water management by HINMAN; petroleum products for

mosquito control by GINSBURG and RUDOLFS ; Paris green by BARBER ; naturalistic control methods by RUSSELL ; adaptability of control measures to Nearctic Anopheles by JOHNSON ; adaptability of control measures to Caribbean vectors by KUMM ; and the anti-malaria programme in North America by WILLIAMS.

Nothing less than this condensed table of contents would give an adequate idea of the ground covered in this remarkable volume. To single out any special articles for comment would be an injustice to others. No relevant considerations of any importance appear to have been overlooked. The book is readable throughout.

Norman White.

MACCHIAVELLO (Atilio) [M.D., Dr. P. H., etc.]. **Contribuciones al estudio de la peste bubonica en el nordeste del Brasil. (Investigaciones realizadas por orden del Director de la Oficina Sanitaria Panamericana, de Washington, bajo los auspicios del Departamento Nacional de Saude Publica del Brasil.)** [Bubonic Plague in North-East Brazil.] 1941. Aug. Publicación No. 165 de la Oficina Sanitaria Panamericana. 331 pp. English summary. Washington : Pan American Sanitary Bureau.

The matter contained in this work is based upon articles and communications already presented by the author and his collaborators. A second volume to deal with plague and non-plague epizootics among rats and other animals is promised later. The present volume has received the approval of Dr. John LONG, the Travelling Chief Commissioner of the Pan American Sanitary Bureau, and is official. Information of a very valuable kind is furnished in detail under the headings : A. General Epidemiology of Bubonic Plague ; B. Clinical and Epidemiological Features of Human Plague ; and C. Experimental Plague.

Some of the important details were summarized in this *Bulletin* [1941, Vol. 38, p. 624] and some of the further points of interest may be referred to here. The previous summary referred to an article in Spanish (*Bol. Oficina Sanitaria Panamericana,* 1941) and the same article in English (*Public Health Reports,* 1941, Vol. 56, p. 1,657). There is an excellent English summary given at the end of the present volume which renders it useful and available to English readers.

Although fleas of many species were found on field rodents, *X. cheopis* was the only ectoparasite actually found infected. Even when *X. brasiliensis,* the other common flea of *Rattus,* was found on a rat from which infected *cheopis* had been taken it failed to produce plague. The author has again demonstrated natural infection with plague of préas (Brazilian opossums), *Mus sylvaticus* and *M. minusculus,* and report was received for the first time in Brazil of infection of *Oryctolagus cuniculus* (rabbit), *Lepus sp.* (hare) and possibly *Oryzomys intermedius.* Epizootic importance is to be attached to the fact that " rat nests remain inhabited by infected fleas after a large part of the rat population has died. The remaining rats are immune to plague and the disease would soon die out . . . were it not for the arrival of new susceptible animals whether as the result of breeding or through migration."

The occurrence of non-plague epizootics in field rodents has apparently been " the basis for the assumption that sylvatic plague exists in Brazil." Plague epizootics may coexist with non-plague

epizootics and this naturally is liable to cause confusion in diagnosis and reporting. "In wild rodents the mixed infection makes it difficult to demonstrate plague, because whereas plague requires at least three days to develop the other disease produces an acute septicaemia in less than 48 hours." Extensive epizootics were noticed also among domestic cats and these have been regarded as due in some cases to a filterable virus. The disease has been given the descriptive name "adeno-myelo-enterosis."

A considerable number of strains of the plague bacillus of human, rodent and flea derivation were studied. It was found that the morphology of cultures depended on the organ from which the strain was taken and on the culture medium rather than on virulence. It was also found that the smooth form of culture instead of being the virulent form was, when present in flat colonies or colonies with a depressed centre, the least virulent. Other observations made were of the antagonism of some Gram-negative bacilli, such as may cause non-plague epizootics, to the development of the plague bacillus itself. A suggestion is also made that the occurrence of these non-plague epizootics in rats might justify further enquiry into the "possibility of reviving the discredited biological prophylaxis" of plague.

W. F. Harvey.

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